



EPSON STYLUS™ Series

Digital Photo Print Guide

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Introduction

In recent years, dramatic advances have been made in printer performance, and now it is possible to output very attractive prints of image data obtained with a digital camera or captured from a scan of positive or negative film stock. Nowadays even black and white photographs can be printed by a digital novice, achieving results equaling that of silver halide prints. Consequently, photographers are now holding exhibitions of their printed photographic works.

Feedback from the market indicates that there is a need for photographers to have a better understanding of how to use color management to its best effect and how to obtain the best results from their image data.

This document explains in a workflow format the points to note when printing a photograph using the latest Epson printers.

- ❑ The setup required for color management and how to use the tools
- ❑ How to choose the paper and ink which play an important role in color tone
- ❑ Points to note when taking photos with a digital single-lens reflex camera and when scanning film
- ❑ Points to note when retouching digital data
- ❑ How to print black and white photos
- ❑ How to set applications and drivers in a color managed environment
- ❑ How to keep your work for a long time

We hope you enjoy creating high quality productions with your Epson printer.

Step 1: System Configuration

The following items are required for printing digital photos (color/black and white).

Image data	Data taken with a digital camera or data taken with a scanner.
Computer	Computer running Windows 2000, XP or higher, or Mac OS X 10.2.8 or higher For details, check the printer and application manuals.
Monitor	The monitor must be calibrated. To calibrate the monitor, use a monitor calibration tool or Adobe Gamma. To avoid the influence of ambient light, we recommend using colorimetric fluorescent lamps and a monitor hood. With LCD monitors, since the color and brightness changes according to the viewing angle, we recommend using a product with a wide viewing angle. It is best to use a monitor with a digital interface, that has good image quality, and that can be set variously with the software. Also, if the image data is Adobe RGB, we recommend using a monitor that supports Adobe RGB. For details, see "Color Management Systems" on page 7.
Colorimeter	Used for calibrating the monitor.
Printer	For photographic works, we recommend using a printer with 6 colors or more rather than a 4-color model. In addition, for making black and white prints, we recommend a model that can use Epson UltraChrome K3 Ink for reproducing neutral grays.
Media (special paper)	For printing using color management, an ICC profile is required for the media. Epson offers ICC profiles that are available for genuine Epson media, so we recommend using Epson brand paper. There are various types of media available to support the diverse applications now available. See your printer documentation for supported paper types. Note: The supported media differs depending on the printer model.
Epson printer driver	A dedicated printer driver (Please check the Epson Web site for the latest version.)
Photo processing application	An application with support for color management. Adobe Photoshop, Adobe Photoshop Elements or similar. Also, for RAW image data, RAW conversion software or the Camera RAW plugin is required.

Column: The importance of RIP

For printing postscript data from programs such as Adobe Illustrator, InDesign or QuarkXPress, a RIP (Raster Image Processor) is necessary. This is because the printer driver requires pixel data while postscript data is vector based.

Step 2: Color Management

Suppose you take pictures with your digital camera, retouch them on your monitor, checking their color, and print them on your printer. This usually will not result in your intended or expected prints. To improve the color appearance of your picture prints, both your monitor and printer should be configured to produce color as close as possible to its original, which will lead to similar color produced by the devices. Such a configuration process is called color management. This chapter explains all about color management, which is essential for creating successful work.

Color Management Systems

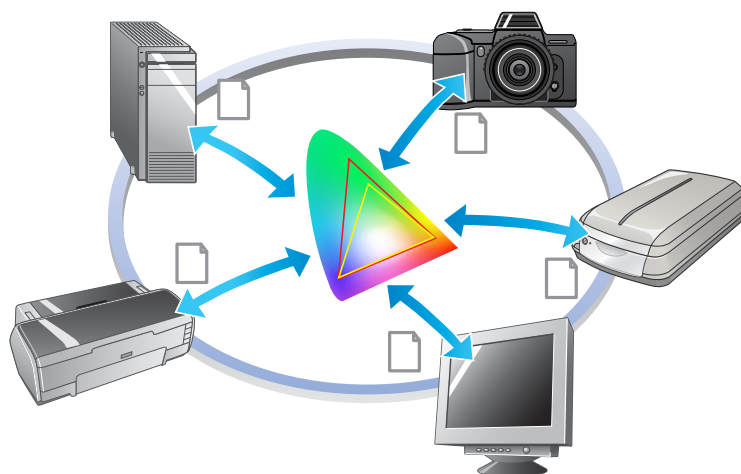
The color tones of the image data can look different when the image is viewed on a display and as a printout. This is because computers, monitors, printers, scanners and other devices each have their own specific color reproduction characteristics. Even if the RGB color information of the original image data is reproduced on another device, it may not be possible to reproduce exactly the same color.

In order to reproduce colors as closely as possible between devices with different characteristics, it is necessary to use a common color space. Alternatively, you can use a process where you translate the color information unique to each device to a common color space, then retranslate the color information to the color space of the next device. Managing the colors used between different devices with a consistent method is called color management.

For performing color matching (standardizing the color space) between devices, color management systems use color information definition files called ICC profiles. The purpose of color management is to make adjustments using the content of the definition file so that the same color is reproduced on any device.

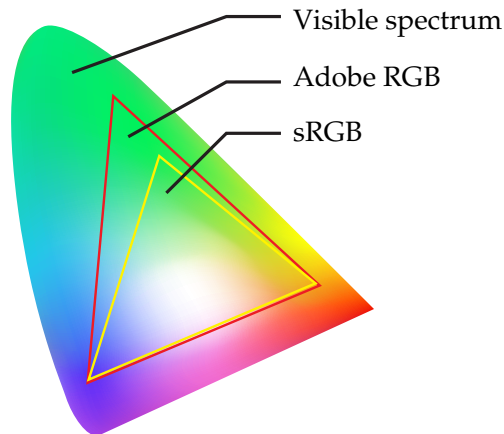
(When data is processed, the profile for the input device that sends the data is called the input profile, while that of the output device, mainly printers that receive the data, is called the output profile.)

Schematic of color management



Color space

Our eyes can only perceive the radiation of the visible spectrum, also called visible light (See diagram below). Computers, monitors, printers, scanners, and other devices can reproduce colors in this visible spectrum.



Because each device has its own feature for reproducing colors, it can only reproduce colors in its gamut. The range of colors that the device can reproduce is called the device's color space.

No device can reproduce all of the colors in the visible spectrum, but the wider the color space is, the more colors the device can reproduce.

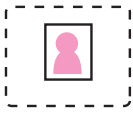

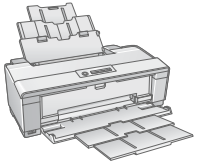
Computers or peripheral devices have used sRGB or Adobe RGB, which typifies the color spaces and complies with monitor characteristics.

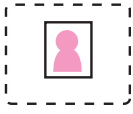

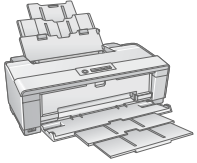
If you want to exchange photo data between devices, for example if you want to load a photo taken with a digital camera into your computer and print it, it is important to match the color spaces.


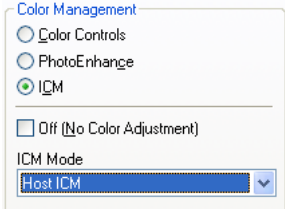
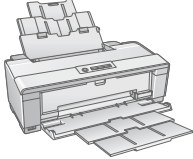
If you print a photo with the Adobe RGB color space using the sRGB color space setting in the driver or print a photo with the sRGB color space using the Adobe RGB color space setting in the driver, the wrong color information is used and the color of the printed photo will differ from the original color of the photo.


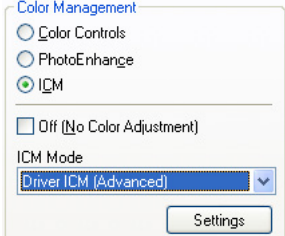
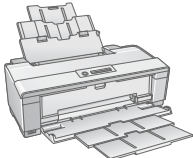
Color Management Methods

Color management is a color matching method that sets the color management functions of the application, printer driver and operating system to refer to the input profile and output profile. There is also a method where you specify the color space in the printer driver when you capture the image. Whatever the method, it is necessary to make these settings in both the application and driver, and if they are not set correctly, color correction will be duplicated and the printed colors will not look right. There are four color management methods, and each is explained in outline below. The first two methods explained are the ones most commonly used.

	Application	Printer driver	Printer
<p>Color management using the driver for aligning color spaces</p>		 <p>Specifying the color mode (color space)</p>	
<p>With this method, you align the color space (sRGB, Adobe RGB) of the image with that of the printer driver color mode without specifying a profile. Although this is a relatively simple operation, you must judge the color space of the image yourself.</p> <p>Note: The color mode for sRGB will be Epson Standard (sRGB) or Epson Standard depending on the printer model.</p> <p>Also, you cannot specify the intent because it is fixed Perceptual. If you use this function, you must make the required settings in the printer driver, and turn off the color management settings in the application.</p> <p>➔ See "Rendering Intent" on page 41. ➔ See "Color management using the driver for aligning color spaces" on page 35.</p>			

<p>Color management using the application</p>			
<p>Specify the Input profile. Specify the printer/paper profile.</p>			
<p>This method uses the color management function (CMM) of the application. This is supported by both Windows and Mac OS, and the print results are the same in both operating systems. It is highly versatile, and color management is typically performed with this method. If you use this function, you must make the required settings in the application, and turn off the color management settings in the printer driver.</p> <p>➔ See "Color management using the application" on page 39.</p>			

	Application	Printer driver	Printer
<p>Color management using Host ICM/ColorSync</p>	 <p>Specify the input profile.</p>	 <p>Specify the printer/paper profile.</p>	
<p>This method invokes the color management function of the operating system from the printer driver. The colors printed will be the same even if you print the same image from different applications. However, there is a slight difference in print results between operating systems. For this method, the application must support the respective functions. If you use this function, you must make the required settings in the printer driver, and set the color management settings in the application to Let Printer Determine Colors. → See “Color management using Host ICM/ColorSync” on page 43.</p>			

<p>Color management using Driver ICM (Windows only)</p>		 <p>Specify the Input profile. Specify the printer/paper profile.</p>	
<p>This method is used when the application does not support color management. However, it is only supported by the Windows operating system. This method uses the color management function of the printer driver. If you use this function, you must make the required settings in the printer driver, and turn off the color management settings in the application. → See “Color management using Driver ICM (Windows only)” on page 48.</p>			

Note:

- ❑ *Whichever method you use for printing, you must set Media Type and Print Quality separately in the printer driver. These settings determine the correct amount of ink discharged for each type of paper.*
- ❑ *Different applications will handle color management differently and not all applications support color management.*

Monitor calibration

In order to display image data with the correct colors as well as contrast and brightness on your monitor, color calibration of the monitor is necessary. The method is explained below.

1. Arrange the ambient light

Set up the monitor where it will not be affected by external light. In particular, avoid windows that are affected by daytime sunlight. In locations where light is reflected or there are background reflections, the colors of data on the same monitor will appear different according to the light source, and you will not be able to observe stable colors.

In order to stabilize the light situation, we recommend that you set up an environment using the following tools.

Use high color rendering fluorescent lamps

Unlike general fluorescent lamps, high color rendering fluorescent lamps have no spectral bias which makes them suitable for observing color. You can buy them at home appliance stores. Use the Color Rendering AAA type.

If the High Color Rendering AAA Cool White fluorescent lamp is not available, use the 3-Wavelength Cool White Type (5000K) or a natural fluorescent lamp.

Cover the monitor with a hood

If you are unable to locate your monitor where the impact of external light can be avoided, or where inside lighting does not cause background reflections, cover the top and sides of the monitor with a commercially available light-shielding hood. You can make your own hood using black cardboard or PVC sheets. PVC sheets should be a dark non-reflective color.

2. Calibrate the monitor

In order to display image data with the correct colors on your monitor, calibrate (adjust) the monitor. There are two methods for calibrating a monitor;

- Using the Adobe Gamma (visual calibration)
- Using a colorimeter

If you need high precision calibration, we recommend that you buy a monitor that comes bundled with adjustment software that uses a colorimeter.

Adjustment of the color temperature of the monitor

Adjusting the color temperature of the monitor before you start makes calibration easier.

You can adjust the color temperature of the monitor so that the white of the paper and the white shown on the screen match. Furthermore, you can use a colorimeter to measure the color temperature of the surrounding light and adjust the temperature of the monitor accordingly.

Calibration using Adobe Gamma

Adobe Photoshop and other similar software come with software called Adobe Gamma which lets you calibrate your monitor easily. Although it is easy to use, adjustment relies on visual observation which depends on ambient light and your own eyesight, so it is not highly accurate. It is less accurate than calibration using a colorimeter. LCD monitors are particularly difficult to set visually, so we recommend that you calibrate LCD monitors with a colorimeter.

Calibration using a colorimeter

There are monitor calibration tools which are comprised of a colorimeter and professional software. With this method, you create a profile by measuring a color patch using the sensor of a colorimeter. This allows you to calibrate your monitor reliably without relying on ambient light. Although it is more accurate than using Adobe Gamma, you must buy a colorimeter. Recently low-cost colorimeters that use a filter have become available, but if you need high precision, we recommend using a spectral colorimeter.

Note:

There are two main ways of calibrating a monitor using a colorimeter.

Software calibration involves color correcting the information obtained with the colorimeter in the video card of the PC. This is a versatile method that can be used with any monitor. Hardware calibration involves using a monitor with color conversion hardware. Here, color correction is performed by the PC video card and the monitor at the same time. Hardware calibration offers the benefit of higher precision and less effort than software calibration, but the monitors themselves cost more.

Step 3: How to Choose the Best Paper and Ink for Your Work

When you print a photo, you may want it to look like a painting or you may want a crisp, sharp photo, depending on your personal taste. Also the final look of your work will depend significantly on the quality of the media that you print it on, not only on the image data itself.

Here you can gain an understanding of the characteristics of the various media and inks before you print it.

Overview of the Media

Media can be roughly divided into glossy and matte types.

Glossy media has a glossy feel, which is a good texture for photographs. This type includes Premium Luster Photo Paper and Premium Glossy Photo Paper, based on the same resin coating used for silver halide prints.

Matte media give a high-quality feel and are suitable for artistic representation. This type includes Velvet Fine Art Paper and UltraSmooth Fine Art Paper, which use acid-free 100% cotton rag, offering velvet feel and higher resistance against weathering (including lighting and ozone).

Note:

The supported media differs depending on the printer model.

Column:

- ❑ *For a printer that supports Epson Ultra Chrome K3 Ink and Advanced B&W Photo mode, Velvet Fine Art Paper is also recommended for printing black and white photos.*
- ❑ *Epson offers a range of media to suit every application and purpose. By selecting a paper according to the type of photo and the look you want to achieve, you can use the texture of the various kinds of paper to add expression to your image.*
- ❑ *Depending on the printer model, there are various types of paper available for you to use for applications such as Photo, Fine Art, POP, Proofing, Sign, and Display.*
- ❑ *It is recommended to use software that supports soft proofing to view the variation in color and tone on the different types of media. If you are unsure whether your software supports soft proofing, please contact the software manufacturer.*

Combining Media and Ink

There are different types of ink such as photo black and matte black suited to the various media. Photo black is especially suited to glossy media, providing a very smooth finish. Matte black obtains very high density output with matte media.

Epson UltraChrome K3 Ink offers delicate monochrome reproduction through using mainly three types of black ink (varying in density) as the main ink together with light color inks. In addition, the printer driver is provided with the Advanced B&W Photo mode that allows you to control these subtle tones. In this way you can reproduce a range of tints and tones exactly as you wish.

Column:

Previously, coloring with light colors was used to achieve subtle tones. However, to minimize this and thereby reduce color differences in different light source conditions, Light Light Black ink is used instead. The color remains stable even under different light sources, ensuring consistently high quality printing.

UltraChrome Hi-Gloss2 ink set brings a glamorous new standard of image quality to glossy photo printing. Compared to the previous UltraChrome Hi-Gloss, the new UltraChrome Hi-Gloss2 features a more brilliant magenta to ensure blue can be printed adequately and a slightly greener yellow to also print more natural greens. The most significant change, however, is the replacement of the blue ink with an all-new orange ink which expands the gamut in the red area, improves the reproduction of yellow, and reduces graininess in skin tones. New UltraChrome Hi-Gloss2 ink set offers a wider color gamut and improved glossiness for better-than-ever image quality.

Note:

Epson Ultra Chrome K3 Ink and Advanced B&W Photo mode or UltraChrome Hi-Gloss2 ink may not be supported depending on the printer model.

Here we suggest some possible combinations.

Media type	Suitable ink set
Glossy media Example: Premium Luster Photo Paper	Photo black
Matte media Example: Velvet Fine Art Paper	Matte black (Some printers can also use photo black)

Note:

The size and type of media supported differs for each printer. Furthermore, the type of ink (photo black and matte black) to use differs according to the type of media.

Step 4: Data Input

How to Input the Data

Here we explain how to transfer the data from your digital camera, scan film, and create the data actually input to your computer.

First we'll explain the data input methods separately for color photos and for monochrome photos. Next, we'll explain how to choose media (paper) size according to the resolution. Finally we'll explain the knack and points to watch for transferring data to your computer.

Color photos

Digital cameras

When you use a digital camera, you can input your photos directly to your computer.

Digital cameras can be divided roughly into replaceable lens types (single-lens reflex, range finder etc.) and compact types.

With single-lens reflex cameras as well as rangefinder cameras, you can change the lens to allow you to photograph a range of different scenes. Also many offer a large CCD size, which makes them suitable for expressing subtle nuances. Compact digital cameras are highly portable, but because they have a small CCD size, they represent half tones poorly. This makes it difficult to take pictures with a lot of depth.

Scanning film

You can use a scanner to capture color negative and color positive film (transparencies) taken with a film camera.

Scanners include dedicated film scanners and flatbed types that can scan printed photos.

Film scanners are generally more expensive, but they can produce detailed data at high speed. Scanners that can scan sizes larger than 35 mm are even more expensive.

Flatbed scanners are a more affordable alternative to film scanners. They are more versatile, able to scan film formats from 35 mm to 4 x 5" film and also printed photos. Overall, flatbed scanners offer good price-performance; the scan quality of flatbed scanners is getting more comparable with film scanners in recent years.

Scanning printed photos

For digitizing printed photos (reflected document), flatbed scanners are generally used.

Most types have a function for automatically restoring the colors of old, faded photos, so you can easily scan and color correct old photos too.

Monochrome photos

Digital cameras

Inputting monochrome photos from digital cameras uses the same method as for color photos. If you take a photo with a digital camera in the monochrome mode, a monochrome photo will be created. However, it is better to process color data as monochrome on your computer, or to use the Advanced B&W Photo setting in the printer driver when you print the image.

This is because monochrome data has just one grayscale channel, whereas color data has three RGB channels, so the tones are richer and can be controlled more precisely.

Scanning film

If you scan color film, you can convert it to monochrome on your computer, or finish it as a monochrome photo with the printer driver settings.

Furthermore, if you scan monochrome film in color mode, you can benefit from the three RGB channels to make adjustments with richer tonality.

Scanning printed photos

Similarly with color photos, use a flatbed scanner.

You can scan monochrome photos directly, or scan color photos and convert them to monochrome on your computer. In either case, if you scan them in color mode, you can make adjustments with richer tonality.

The Right Resolution for Output Size

Resolution

In order to print photo data well, the data must have the right resolution for the print size. If the resolution is too low for the print size, the image will not be printed crisply, and it will appear blurred. Furthermore, if it is too high, the image will be printed crisply, but the large data size puts an unnecessary burden on the computer. Resolution indicates the number of pixels within one inch. It is shown as a dpi (dots per inch) or ppi (pixels per inch) value.

The relationship between image data resolution and print size

You can check the rough resolution to use for scanning and the data size for digital cameras in the table below. Use this table to make image data the right size for printing your work.

An output resolution of 300 to 360 dpi is recommended, but the tolerance differs according to the viewing conditions of the work. If you view the production from far away, a slight loss of detail is not a big problem, but if you view the work close up, high-definition printing is required.

Also if the image is cropped, the resolution may not be enough for the print size. If you crop the image, use the formula on the digital camera page to check whether the vertical and horizontal image size (number of pixels) is appropriate.

- The data volume is large, and printing simply takes longer. There will be no change if the print quality is equivalent to green in the table.
- Irrespective of the picture and viewing distance, the relevant image data will produce sufficiently high-definition print quality (recommended).
- Although image quality is very good, the image may lack detail depending on the picture and viewing distance.
- Although image quality is suitable for practical use, the image will lack detail depending on the picture and viewing distance.
- Print quality will be unsuitable for viewing.

Digital cameras

Digital camera data is expressed in the number of pixels (picture units).

You can check the number of pixels in the image properties in Windows Picture and Fax Viewer in Windows XP.

Formula for print size and number of pixels (When the resolution of the image data is 360 dpi)

Number of pixels suitable for the output size <Horizontal (vertical)> = Output size <Horizontal (vertical)> (mm) × 360 (dpi) ÷ 25.4 (mm)

Suitable print size <Horizontal (vertical)> (mm) = Number of pixels <Horizontal (vertical)> (mm) ÷ 360 (dpi) × 25.4 (mm)

Example

A. With an A4 (210 × 297 mm) print

Horizontal (Long side) : $297 \times 360 \div 25.4 =$ About 4,209 pixels

Vertical (Short side) : $210 \times 360 \div 25.4 =$ About 2,976 pixels

If you print on A4 size at 360 dpi, data with about 12,600,000 pixels ($4,209 \times 2,976 = 12,525,984$ pixels) is necessary.

B. With 6,000,000 (3,008 × 2,000) pixel data

Horizontal (Long side) : $3,008 \div 360 \times 25.4 =$ About 212 (mm)

Vertical (Short side) : $2,000 \div 360 \times 25.4 =$ About 141 (mm)

With 6,000,000 pixels, you can print at 360 dpi on 212 × 141 mm paper.

Pixels	Print Size						
	4 × 6" (100 × 150 mm)	5 × 7" (130 × 180 mm)	8 × 10" (203 × 254 mm)	A4 (210 × 297 mm)	10 × 12" (254 × 305 mm)	A3 (297 × 420 mm)	13 × 19" (329 × 483 mm)
5 million pixels (2736×1824 pixel)	463 dpi	386 dpi	274 dpi	234 dpi	228 dpi	165 dpi	144 dpi
6 million pixels (3008×2000 pixel)	509 dpi	424 dpi	300 dpi	257 dpi	251 dpi	182 dpi	158 dpi
8 million pixels (3488×2320 pixel)	590 dpi	492 dpi	349 dpi	298 dpi	290 dpi	211 dpi	183 dpi
10 million pixels (3872×2592 pixel)	656 dpi	546 dpi	387 dpi	331 dpi	322 dpi	234 dpi	204 dpi
12 million pixels (4288×2848 pixel)	726 dpi	605 dpi	428 dpi	366 dpi	357 dpi	259 dpi	225 dpi
14 million pixels (4608×3072 pixel)	780 dpi	650 dpi	461 dpi	394 dpi	384 dpi	279 dpi	242 dpi

The number of pixels is shown as an approximate figure because the actual image size may differ depending on the digital camera manufacturer and the aspect ratio (the vertical and horizontal ratio of the image). The resolution is calculated from the number of pixels on the long side of the image and the size of the long side of the paper.

Scanner

35 mm film

Resolution	Data Size	Print Size						
		4 × 6" (100 × 150 mm)	5 × 7" (130 × 180 mm)	8 × 10" (203 × 254 mm)	A4 (210 × 297 mm)	10 × 12" (254 × 305 mm)	A3 (297 × 420 mm)	13 × 19" (329 × 483 mm)
2400 dpi	22 MB	576 dpi	480 dpi	340 dpi	291 dpi	283 dpi	206 dpi	179 dpi
3200 dpi	39 MB	768 dpi	640 dpi	454 dpi	388 dpi	378 dpi	274 dpi	239 dpi
4800 dpi	88 MB	1152 dpi	960 dpi	680 dpi	582 dpi	567 dpi	411 dpi	358 dpi

6 × 7 film

Resolution	Data Size	Print Size						
		4 × 6" (100 × 150 mm)	5 × 7" (130 × 180 mm)	8 × 10" (203 × 254 mm)	A4 (210 × 297 mm)	10 × 12" (254 × 305 mm)	A3 (297 × 420 mm)	13 × 19" (329 × 483 mm)
1200 dpi	25 MB	672 dpi	517 dpi	331 dpi	320 dpi	265 dpi	226 dpi	204 dpi
1600 dpi	44 MB	896 dpi	689 dpi	441 dpi	427 dpi	353 dpi	302 dpi	272 dpi
2400 dpi	99 MB	1344 dpi	1034 dpi	662 dpi	640 dpi	529 dpi	453 dpi	409 dpi
3200 dpi	222 MB	2016 dpi	1551 dpi	993 dpi	960 dpi	794 dpi	679 dpi	613 dpi
4800 dpi	395 MB	2688 dpi	2068 dpi	1324 dpi	1280 dpi	1058 dpi	905 dpi	817 dpi

4 × 5 film

Resolution	Data Size	Print Size						
		4 × 6" (100 × 150 mm)	5 × 7" (130 × 180 mm)	8 × 10" (203 × 254 mm)	A4 (210 × 297 mm)	10 × 12" (254 × 305 mm)	A3 (297 × 420 mm)	13 × 19" (329 × 483 mm)
800 dpi	37 MB	768 dpi	591 dpi	378 dpi	366 dpi	302 dpi	259 dpi	233 dpi
1200 dpi	82 MB	1152 dpi	886 dpi	567 dpi	549 dpi	454 dpi	388 dpi	350 dpi
1600 dpi	146 MB	1536 dpi	1182 dpi	757 dpi	731 dpi	605 dpi	517 dpi	467 dpi
2400 dpi	330 MB	3456 dpi	1772 dpi	1135 dpi	1097 dpi	907 dpi	776 dpi	700 dpi

The figures in the table show the relationship between digital camera and scanner resolution, and output resolution. If this figure is 200 dpi or more, you will obtain a satisfactory print, and if it is 300 dpi or more, your print will be at a high resolution. If for example, you scan 35 mm film and print it, if the scanner has optical resolution of 3,200 dpi, the output will be good enough for viewing on paper up to A3 large size. If you scan at the maximum value for output resolution, the volume of data will be unnecessarily big, making it difficult to handle.

In case you feel a printed image with 300 dpi lacks detail, use an application such as Photoshop to convert the resolution of the image data to 360 dpi, and then adjust the sharpness and reprint. You may see an improvement of the detail in the result.

Even if the output resolution is the same, the detail that you can obtain will differ according to the size of the CCD element of your digital camera or the film size.

Inputting Data

Color space

For data that includes color and tones, it is important that each device handles color in the same way. If you do not use a consistent color space from input to output, it will be difficult to achieve consistent colors. The main color spaces used by digital cameras are Adobe RGB and sRGB. It is important to understand their respective features and use them appropriately according to your purpose.

→ See “Color space” on page 8.

Color photos

Adobe RGB is a bigger color space than sRGB. The space for blue and green in particular is bigger, which is useful for capturing the blue of the sea and the vivid green of trees for nature and scenery photography.

Many general monitors do not support Adobe RGB, so you can set up an sRGB environment at lower cost. However, even if your monitor does not support Adobe RGB, Epson printers can output data that uses the Adobe RGB color space. Although the colors on the screen and in the print will differ slightly, printing the data without adjusting it will give you an idea of how to adjust it to create the work that you want.

Monochrome photos

Although difference in color is not an issue here, if you create the data for monochrome photos using the three RGB channels, the issues regarding color space will be the same as with color photos, so differences in representing half tones will also arise.

Digital cameras

Taking photos

When you take photos, avoiding whiteout and blackout is important. Although you can adjust contrast and sharpness slightly later, note that you cannot adjust parts that exhibit whiteout or blackout.

Furthermore, although it may be necessary to achieve the image you want, adjustment can be difficult in backlit portraits and instances when objects of widely differing brightness are included in the same scene. In this case, use the auto bracket function to take the picture at several different exposures.

If you take a photo with the intention of adjusting it later, you will have more leeway to achieve richer tonality if the shadows and highlights are fairly uniform, with low contrast, or in other words, if you take a 'flat' picture.

The types of data format

JPEG

- ❑ Used by many cameras such as digital single-lens reflex cameras and compact digital cameras.
- ❑ Picture making is performed either by the person taking the photo, or using the preset image processing unique to the camera.
- ❑ Each RGB color has data with 256 levels (8 bits).
- ❑ The volume of data is low, but when the data is saved (compressed), part of the data is lost, so that the image deteriorates if you retouch and save it repeatedly.

TIFF

- ❑ A commonly used image format.
- ❑ The volume of data is high, but the image does not deteriorate even if you save it repeatedly. It can also be used in many different applications, so it is often used for saving images after retouching them.

RAW

- ❑ The color and light information obtained by the picture elements of the camera are recorded without modification. It's saved directly in the recording media without going through image processing in the camera.
- ❑ You can change the white balance, contrast, and gradation easily after shooting a picture.
- ❑ Because the data format used by each camera manufacturer is different, it cannot be displayed directly in commercial applications and must be converted (developed) into a format such as JPEG or TIFF.
- ❑ In many cases, RAW has more levels than JPEG (12 bits/4,096 levels or 22 bits/around 4,190,000 levels) and if you save it in a format that can handle a similar number of levels such as TIFF or Photoshop PSD, you can keep deterioration of the image to a minimum.

Scanning

Color film

Loading the film

When you scan film, be careful not to get dust or fingerprints on the film while loading it.

With 35 mm film, small dust and fingerprints are greatly enlarged, making it difficult to remove them by retouching. It is best to use gloves to avoid touching the film with your bare hands. Also, you can use a blower to clear away dust.

Although Digital ICE™ is able to remove effects of dust in scanned image, it is not a perfect system. Therefore the best result is still obtained by proper cleaning and handling of film.

Note that Digital ICE™ does not support Kodachrome™ and monochrome films.

Turn on the scanner approximately 30 minutes before use. This will allow the cold cathode light source to become stable. If your scanner uses Epson's ReadyScan LED Technology it can be used virtually instantly.

Driver settings

Select the best resolution referring to the table on the previous page.

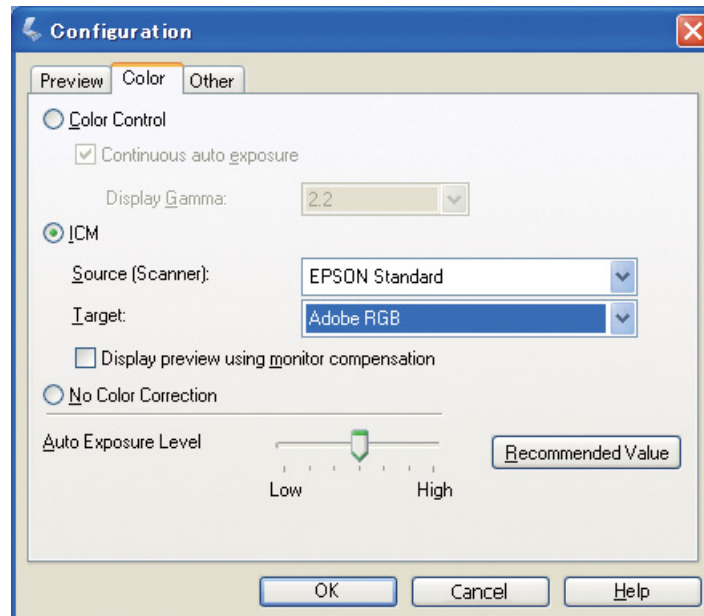
If you scan allowing a bit of leeway at both ends of the histogram on the premise that you will adjust the image, you can adjust without loss of tonality. In this case, it is best to scan with the 48-bit mode and save as a TIF file. You can then later reduce the color depth to 24 bit after you have made your adjustments and save the final version as a JPEG file to compress the data.

Also, if you use negative film, by photographing a color chart when you take your pictures, you can easily reproduce colors accurately, even if you scan with automatic settings.

EPSON Scan configuration

With photos captured with a scanner, if you scan with the default TWAIN driver settings, the tag that indicates the color space will not be attached and the color space may not be recognized correctly.

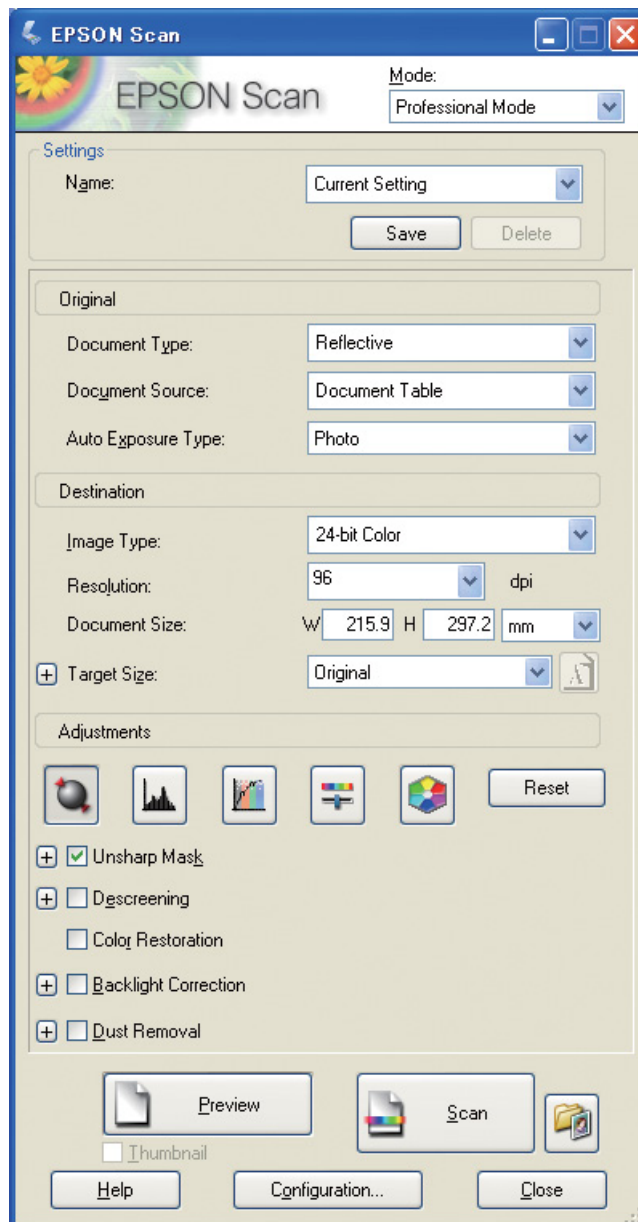
To specify the color space of the photo, set the Epson TWAIN driver (EPSON Scan) as shown below. With EPSON Scan 3.2 it is possible to also embed the profile into your scanned file.



- 1 Start EPSON Scan from the Start menu or from the shortcut icon on the desktop.
If scanning starts automatically, click **Cancel** to cancel scanning.
If you are using a Mac OS X, open the **Applications** folder and double-click the **EPSON Scan** icon.
- 2 Select **Professional Mode** from the mode pull-down menu.
- 3 Click the **Configuration** button to display the Configuration dialog box.
- 4 Click the **ICM** radio button, and select **EPSON Standard** for Source (Scanner), and **Adobe RGB** for Target.

Select the **Display preview using monitor compensation** check box. This displays the preview with the same colors as the photo displayed in Photoshop Elements.
- 5 Click **OK** to close the screen.

Scanning for correct output



When you capture photos and film, it is best to create data that is no bigger than the size required for output.

If the image resolution for a specific output size is 360 dpi, the resolution of the final print is sufficient also for a short viewing distance. If, however, your scan resolution exceeds this, in general, it will not improve the quality of the final print. Due to the larger file size, it will however take longer to scan, to process, and to print.

For setting optimum resolution for the output size, refer to "The relationship between image data resolution and print size" on page 17.

- 1 Specify the type of document for scanning.
- 2 Enter the resolution for printing.
- 3 Enter the size of the paper for printing.

Monochrome film

Monochrome film represents images only with contrasting tones, so having a lot of tones will result in a more expressive print.

If you scan at the 1 color monochrome setting, you can use 24-bit (8 bits × 3) levels. If you scan in grayscale, scan at 16 bits and save the image in the file format of your application (TIFF, Photoshop PSD etc.) Note that if you save it as JPEG, it will be reduced to 8 bits. Also, some applications do not handle 16-bit/channel images.

Print photos

As with film, take care not to get dust and fingerprints on the photos. Also when you place the photo on the scanner, place it as straight as you can. You cannot use Digital ICE™.

Assembling images in applications

If you create data in an application, the way that data is handled in paint applications and drawing applications is different.

Paint application data

Data created in a paint application is composed of a series of pixels called a dot map. Captured photos are one example. Therefore you have to pay attention to color space and resolution like you do for an image taken with a digital camera.

In paint applications like Photoshop and Paint shop, you can scan in materials directly and apply various effects to scanned photos.

Drawing application data

While paint data is composed of a series of pixels, drawing application data consists of mathematical vectors.

2D/3D CAD software such as AutoCAD and Illustrator are the main types. To explain the difference between pixel data and vector data, as per example, let us have a look at the image of a circle.

In pixel data, all the pixels are fixed based on the resolution and dimension of the circle.

For vector data the circle is defined by its relative radius, as well as the point of the center in the coordination system. Hence, it is all relative; therefore, you can increase the size without loss in quality since the position of the pixels is defined at the last possible moment.

Step 5: Adjusting the Data

Preparing to Adjust the Data

If your photo or scanned data is not the way you want it, you can adjust it using a photo retouching application. In this chapter we explain how to correct common problems (weak tonality, whiteout, blackout and so on) and how to turn a color photo into black and white.

First, install a photo retouching application on your computer.

Applications

Choosing an application

There are various applications available, such as Photoshop CS, Photoshop Elements, Paint Shop, and GIMP. There are other operating system-specific products, but the file formats that they can handle are restricted or their range of functions is limited. We recommend using a dedicated application. For more information, please consult the manufacturers of the respective products.

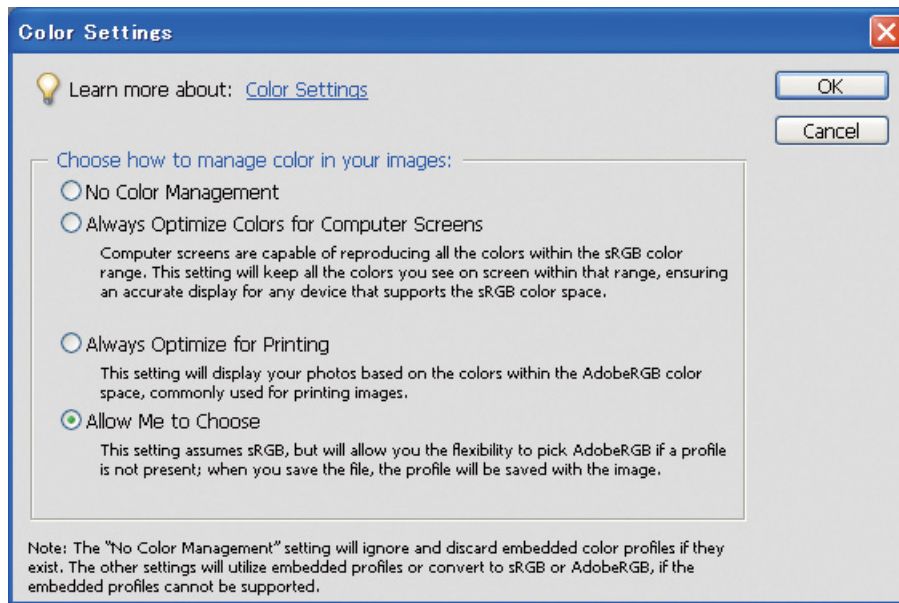
Setting the color space

After opening the photo data, and before starting work, set the color space. If the color space of the data and the color space of the application conflict, you will find it difficult to print with the right colors.

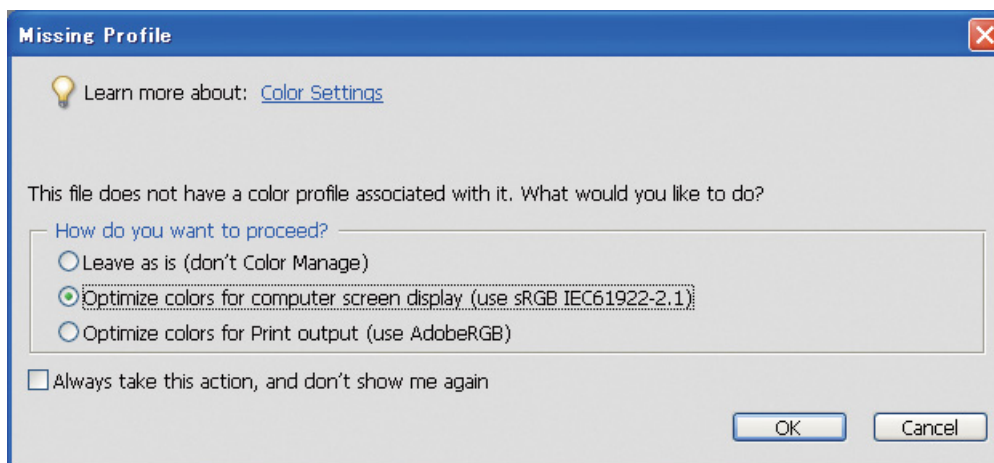
With Photoshop Elements 5.0

With Photoshop Elements 5.0, set the working environment before opening the photo data.

- 1 From the Edit menu, select **Color Settings** to display the Color Settings dialog box, and select the **Allow Me to Choose** radio button.



When you select this option, if the photo data does not have a profile, the following message is displayed, and you can select a color space. If you took the photo in Adobe RGB, select the **Optimize colors for Print output (use AdobeRGB)** radio button. If you took the photo in sRGB, select the **Optimize colors for computer screen display (use sRGB IEC61966-2.1)** radio button. If you do not know what color space you used to take the photo, select this option.



Note:

If the photo data has a profile and the working color space is set accordingly, there is no impact on the image whichever working color space is set.

- 2 Click **OK** to close the Color Settings dialog box.

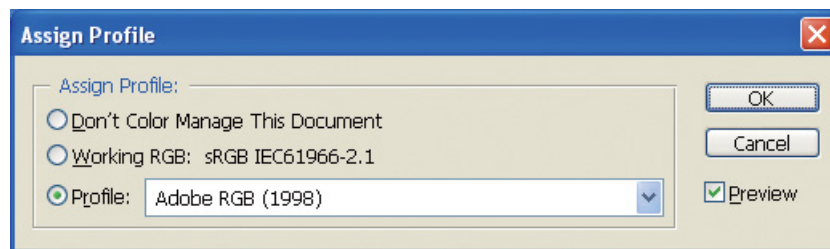
With Photoshop CS3

1 From the Edit menu, select **Assign Profile** to display the Assign Profile dialog box.

2 Check if the color space set when you took the photo has been recognized correctly.

If you select **Color Settings** from the Edit menu in Working RGB, the name of the working color space set is displayed in the Color Settings dialog box that appears. If the color space set when you took the photo and the working color space are the same, the **Working RGB** radio button is checked. If the color space set when you took the photo and the working color space are different, the **Profile** radio button is checked and the profile name is displayed. In either case, the color space has been recognized correctly.

If the **Don't Color Manage This Document** radio button is selected, the color space will not be recognized correctly, so please specify a color space. (This happens when you try to open or save images in applications that do not support color management.) In this case, select the **Profile** radio button and select **Adobe RGB (1998)** from the pull down menu if you took the photo in Adobe RGB. If you took the photo in sRGB, select **sRGB IEC61966-2.1** from the pull down menu. If you do not know what color space you used to take the photo, select **sRGB IEC61966-2.1** as this is used as the standard color space by most camera makers.



3 Click **OK** to close the Assign Profile dialog box.

Note:

Every time you change from one color space to the next, with the exception of Lab, you also lose information.

Test printing

First print the photo without adjusting it as a basis for considering what sort of work you want to make.

For example, if you display photo data that uses the Adobe RGB color space on a typical monitor, most colors will be displayed correctly. However, colors like vivid green and deep blue that are beyond the sRGB color space cannot be displayed so the colors will be reduced. For this reason, the colors that you see on the monitor and the colors in the printed photo look different.

In order to align the colors on the monitor and the printed colors more closely, you can use a monitor that supports Adobe RGB and carry out color proofing of the device using a color calibration tool.

Uniform color space

It is important not to change the color space during printing.

If the source (original data) is sRGB and if you use the sRGB color space in the workspace of the application and the driver settings, you can reproduce the colors in the source without any changes in color during the operation.

Care is required with the settings for color space in the various steps, for example in the color management dialog box settings for the workspace when you open the data and when you print it from the application, and in the printer driver paper settings and color control.

ICC profile

If you use a color management system that uses ICC profiles, you can prevent differences in the colors between devices more precisely. Instead of simply aligning the color spaces, you can carry out more precise color alignment.

→ See “Printing Color Photos” on page 35.

Adjusting the Photo Data

Cautious adjustment

The purpose of adjustment is to correct possible issues with the data to improve the final image. If gradations are lost in the data due to whiteout, blackout, saturation of colors and other problems, the print will not look its best. Conversely if you adjust the data too much, noise and unevenness in color may arise, so that the print will not turn out as you hoped. In particular, excessive color saturation should be avoided. Although the colors may look vivid on the screen, you may not notice that you have made them too intense, so that gradation is lost in the printed results. Also, please note that there is only so much adjustment that can be done without incurring a loss in image quality and data.

Adjust the data after saving it in a format other than JPEG such as TIFF or Photoshop PSD. With JPEG, the image deteriorates each time you adjust and save it.

Monochrome photos

There are various methods of making a color photo into a monochrome photo.

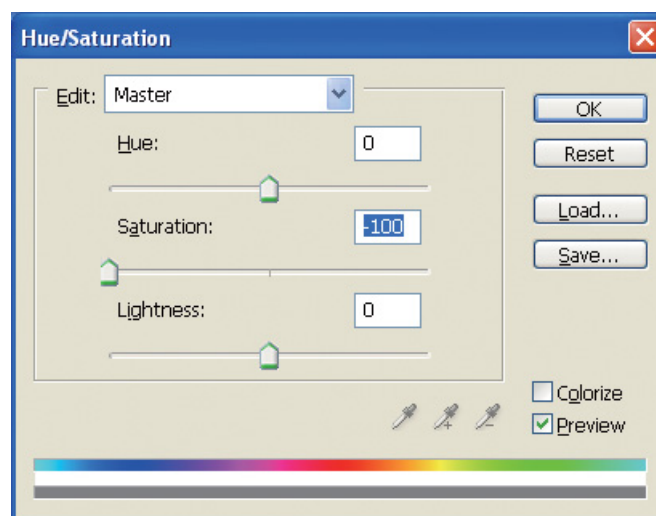
You can also use the color photo directly without adjusting it, or you can print a monochrome photo making fine adjustments to the level in the Epson printer driver.

→ See “Printing Monochrome Photos” on page 54.

Eliminate color saturation

If you eliminate color saturation by setting the value for saturation to -100 in the hue/saturation adjustment, you can turn a color photo into a monochrome photo. This is a good method when the source data is JPEG.

JPEG files have 8 bits (256) of level in each of the RGB channels. In other words, one photo is represented by 24 bits (16,770,000 levels). This method simply uses these levels as monochrome.



Notes for Adjusting Data

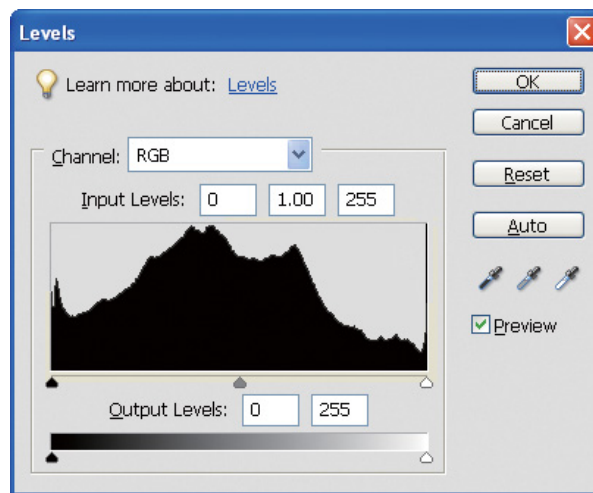
Data viewed as a histogram

Viewing the data in simplified form (histogram)

Image processing software like Photoshop has a function for showing the distribution of brightness in the image.

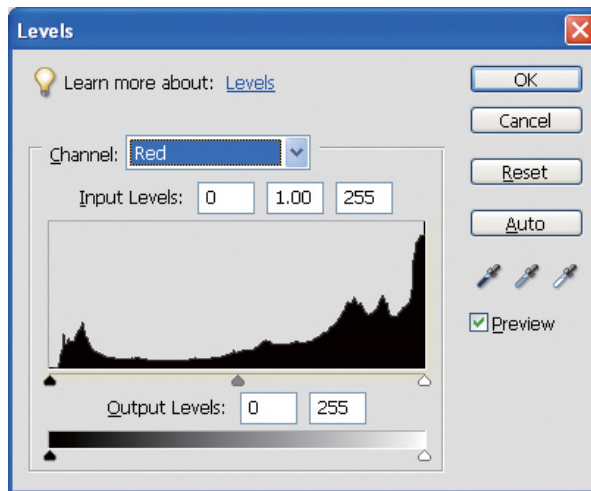
This histogram allows you to view all the colors and each RGB color as peaks, and to check whether the colors and brightness are within the reproducible range.

The parts at the ends of the scale (255 and 0) indicate the parts where tonality is lost. Since this part lacks tonality, it is filled with flat color, and if you actually print it, the result will lack any expression.



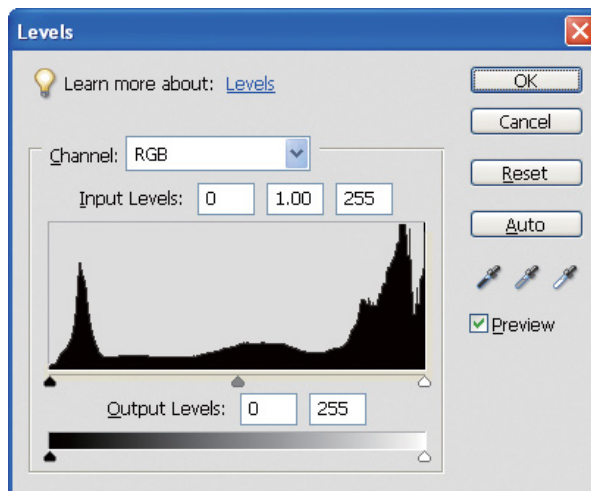
An example of a poor histogram for RGB

If it is up against the right side, it indicates that many parts will show whiteout.
If it is up against the left side, it indicates blackout.



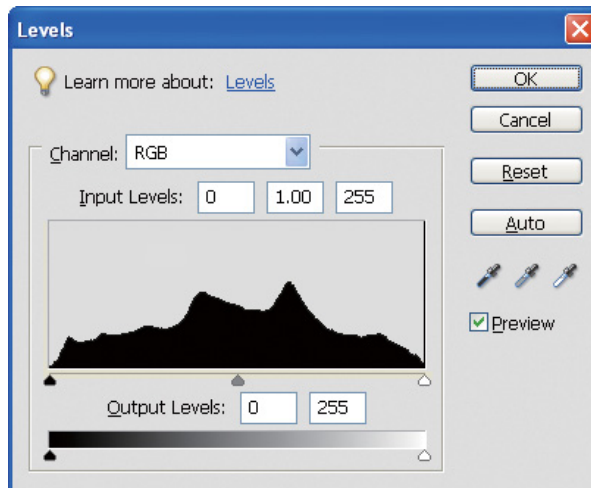
An example of a poor histogram for Red

If the histogram for Red is up against the right side, the saturation has been increased too much, and red color components will be oversaturated and toneless.



An example with low peaks for mid levels, and high peaks at both ends

Very light and very dark objects are both present in the image. Therefore one of the levels will be lost.

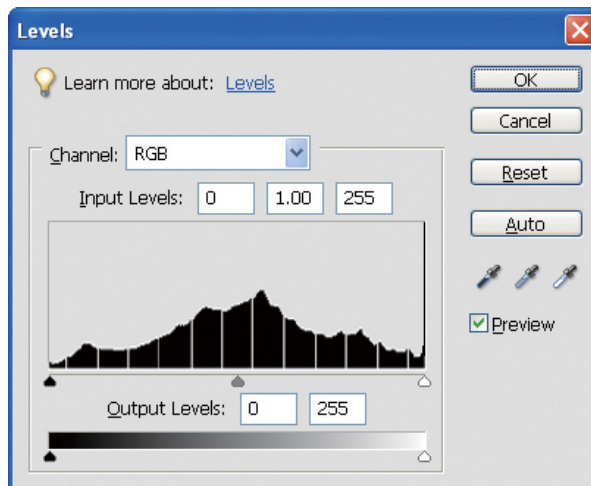


A good example with no loss of level

There are plenty of mid level components, and they are distributed evenly.

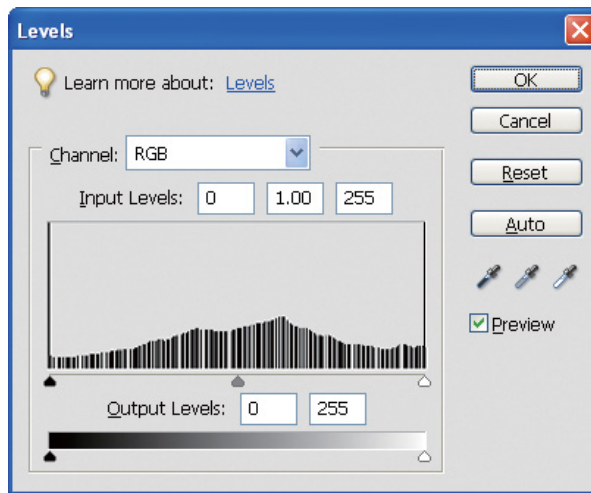
Of course, just because levels are distributed at both ends the data does not necessarily indicate a poor photo. These parts may be necessary to get the atmosphere that you want after adjusting the image. Conversely, if the levels are concentrated in the middle and there is no distribution at either end, the photo will lack character.

When some adjustment is made in the Levels dialog box, the number of the gradation will be decreased accordingly because it is re-composed in the range of 0 to 255, and then the histogram will be as shown below. White lines show the lost gradation; however, it is okay as long as the adjusted image looks satisfactory.



An example of histogram after Levels adjustment

If too great an adjustment is made, there will be a lot of white lines and the adjusted image does not look good.



A bad example of histogram after Levels adjustment

Resolution

Please refer to the resolution table.

→ See “The relationship between image data resolution and print size” on page 17.

If you have trimmed the image and changed its composition, check that it has the right resolution for the print size.

If it lacks resolution, details will be lost and the print will appear blurred.

Step 6: Printing

This chapter explains how to print color and monochrome photos.

It explains the settings for using color management with the printer driver and application when you print color photos, as well as the settings for the Advanced B&W Photo mode in the printer driver used for printing monochrome photos.

Printing Color Photos

Here we explain the settings for using color management in the printer driver and application.

For an overview of color management, refer to “Color Management Systems” on page 7.

Color management settings

For this explanation, we'll look at the color management settings for the most common application. You must use an application with support for color management systems, but here we'll use Adobe Photoshop Elements 5.0 in Windows.

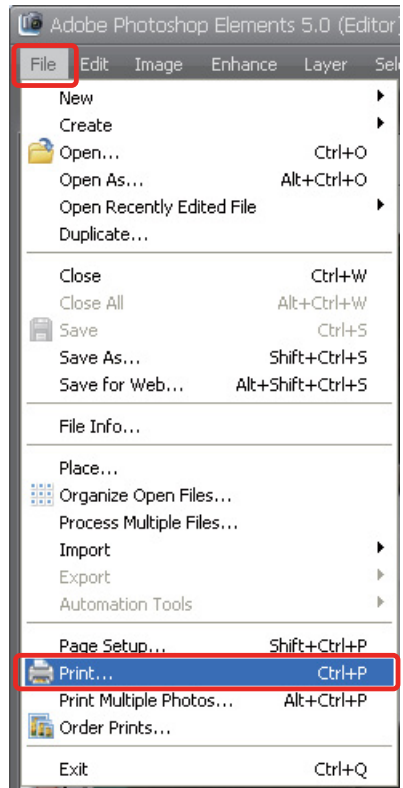
Color management using the driver for aligning color spaces

Note:

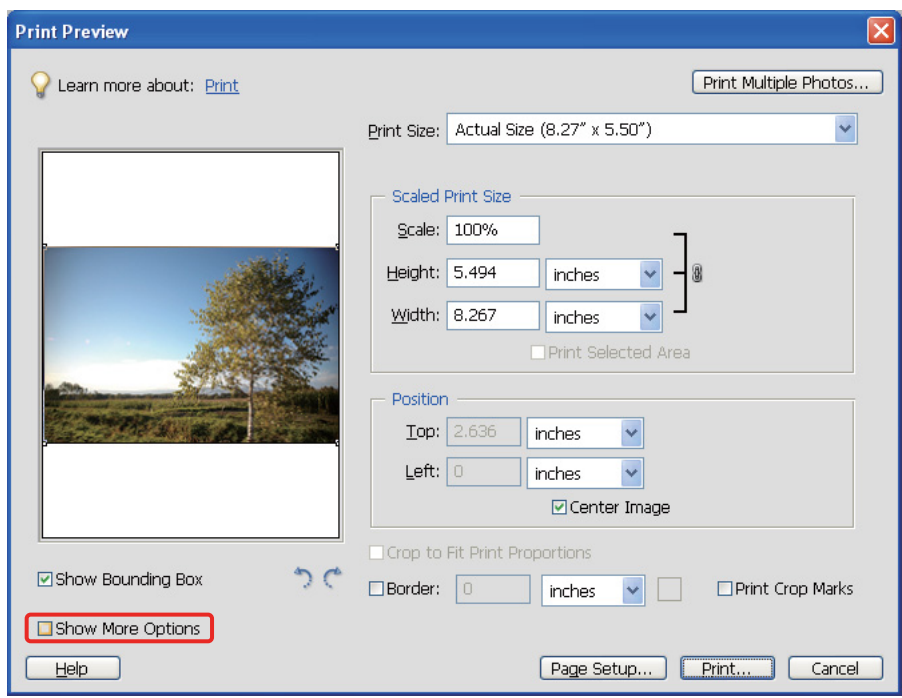
The printer driver type and supported OS differ depending on the printer model.

Turn off the color management function of the application

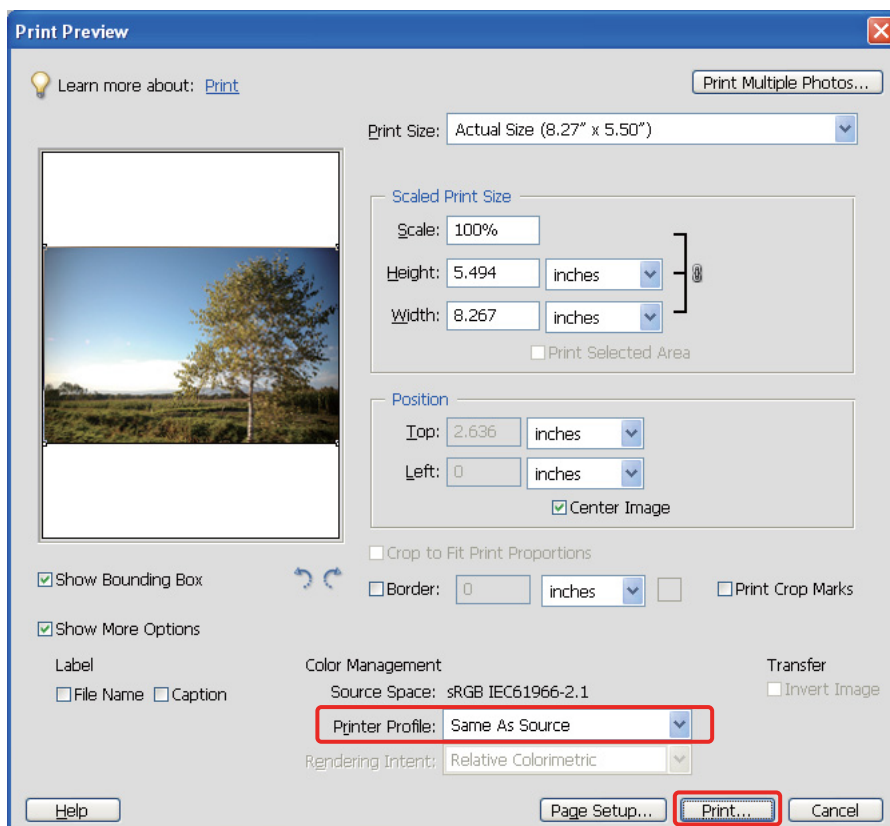
1 From the File menu, select **Print**.



2 Select **Show More Options**.



- 3** In the Color Management of the Printer Profile menu, select **Same As Source**, and then click **Print**. In Adobe Photoshop CS3, select **Color Management**, and then click **Document** for the Print. Select **No Color Management** for the Color Handling. Then click **Done**.



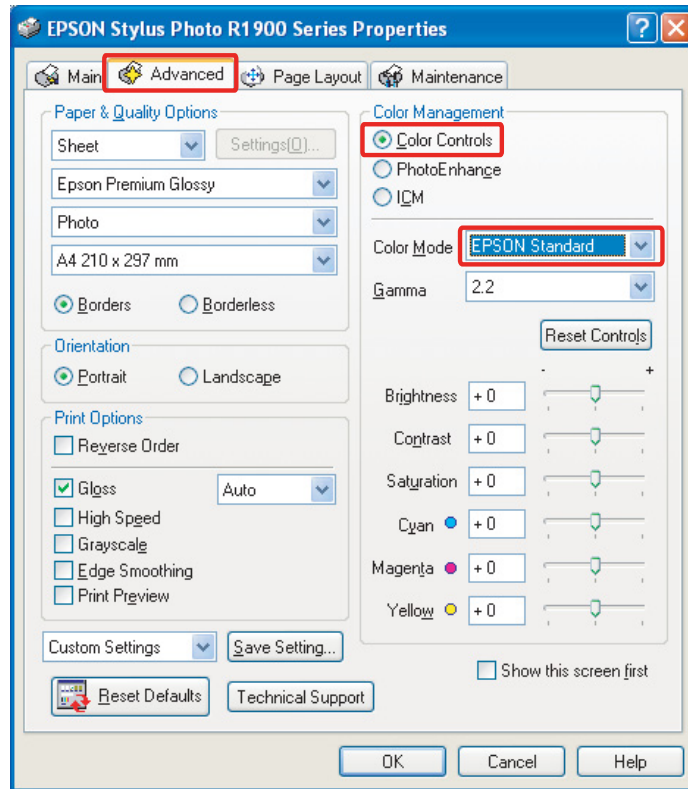
Set up the printer driver

- 4** Open the printer driver window (Windows) or the Print dialog (Mac OS X).
- 5** For Windows, click the **Advanced** tab and select **Color Controls (Type A)** or select **Automatic** for the Mode in the Main menu (Type B). Then select **EPSON Standard (sRGB)** or **Adobe RGB**.

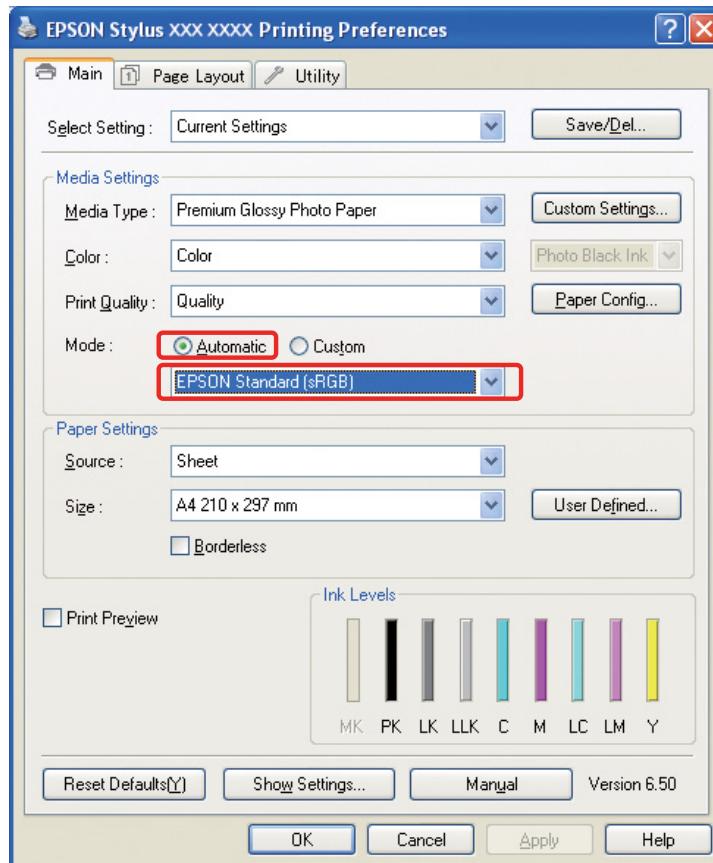
Note:

- ❑ The choice of **EPSON Standard (sRGB)** or **Adobe RGB** depends on the color spaces of the image which was set when it was taken with a digital camera or captured with a scanner.
- ❑ Depending on the printer model, **EPSON Standard (sRGB)** appears as **EPSON Standard**.
- ❑ The printer driver type and supported OS differ depending on the printer model.

Type A



Type B



For Mac OS X, do the following depending on the printer driver type.

<OS 10.4 or below>

Select **Color Management**, click **Color Controls**, and then select **EPSON Standard (sRGB)** or **Adobe RGB** for the Mode.

<OS 10.5>

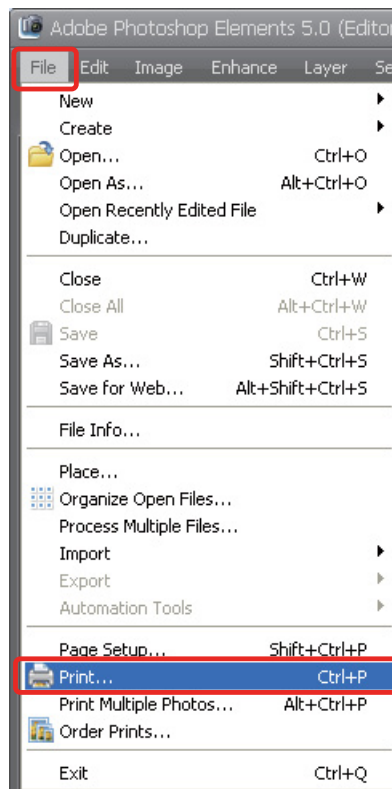
Select **Print Settings**, select **Color Controls** for the Color Settings, and then select **EPSON Standard (sRGB)** or **Adobe RGB**.

- 6 Check the other settings and print the image.

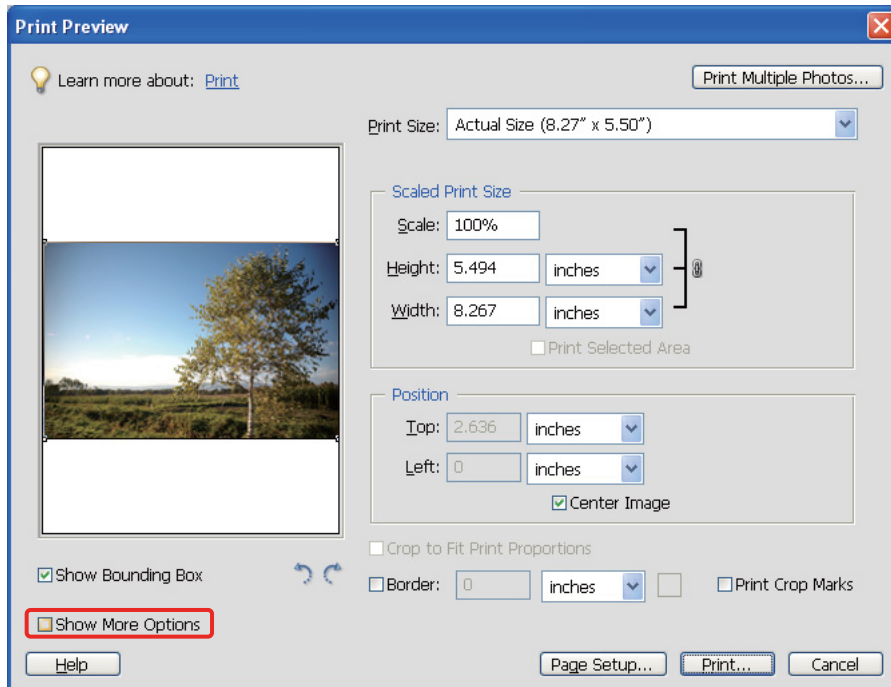
Color management using the application

Set the application

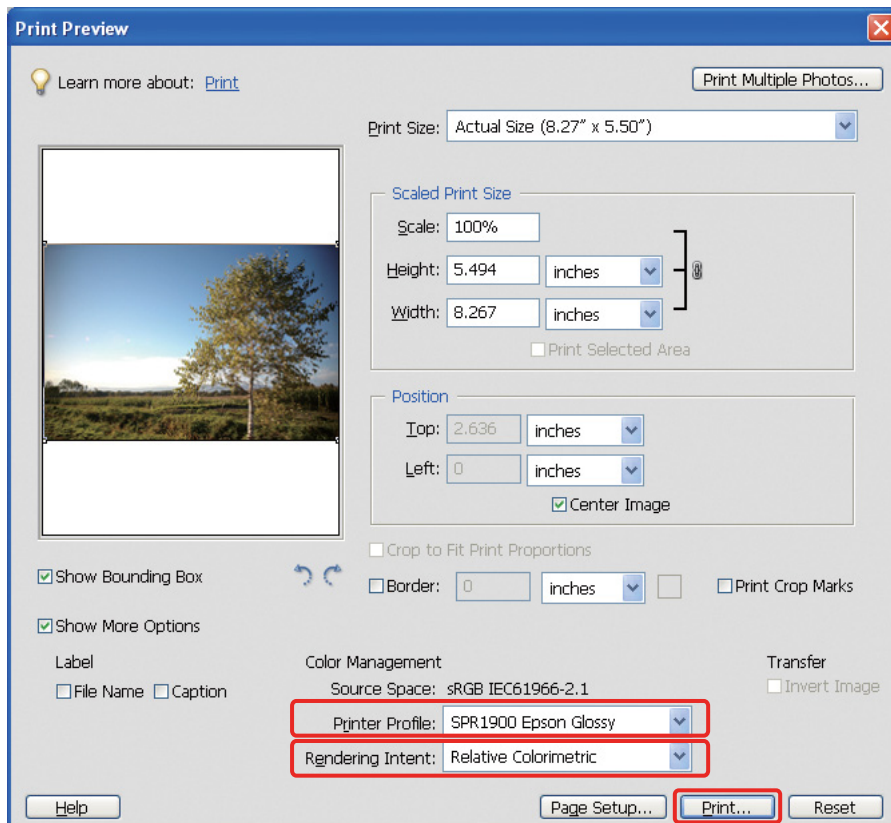
- 1 From the File menu, select **Print**.



2 Select **Show More Options**.



3 In the Color Management of the Printer Profile menu, select the ICC profile of the paper to use for printing and Rendering Intent, and then click **Print**. In Adobe Photoshop CS3, select **Color Management**, and then click **Document** for the Print: Select **Photoshop Manages Colors** for the Color Handling. Next select the Printer Profile and the Rendering Intent, then click **Done**.



Rendering Intent

There are four methods for color matching, of which we need to choose one. We recommend using **Perceptual** for photographic images. The characteristics of each method are shown below.

Saturation	In order to emphasize saturation, for colors with high saturation, the difference between the color reproduced on the monitor and the color reproduced by the printer is set greater than that of other intents. It is suitable for posters where the color reproduced on the monitor need not be matched closely.
Perceptual	Priority is given to brightness rather than to color saturation. In order to maintain the visual relationship between level (the linkage between colors) and color, it is considered best for reproducing photographic images to make the colors reproduced by the printer close to the appearance of the image on the monitor.
Relative colorimetric	Similar to perceptual. However, hue is emphasized more, and the hue of the source image is reproduced in the print.
Absolute colorimetric	Unlike the three types above, the white parts of the image data are not corrected to match the color of the paper. (The white parts of the image data are reproduced by applying ink.) Otherwise it is the same as relative colorimetric. This is suitable, for example, for print simulation.

Turn off the color adjustment function of the printer driver

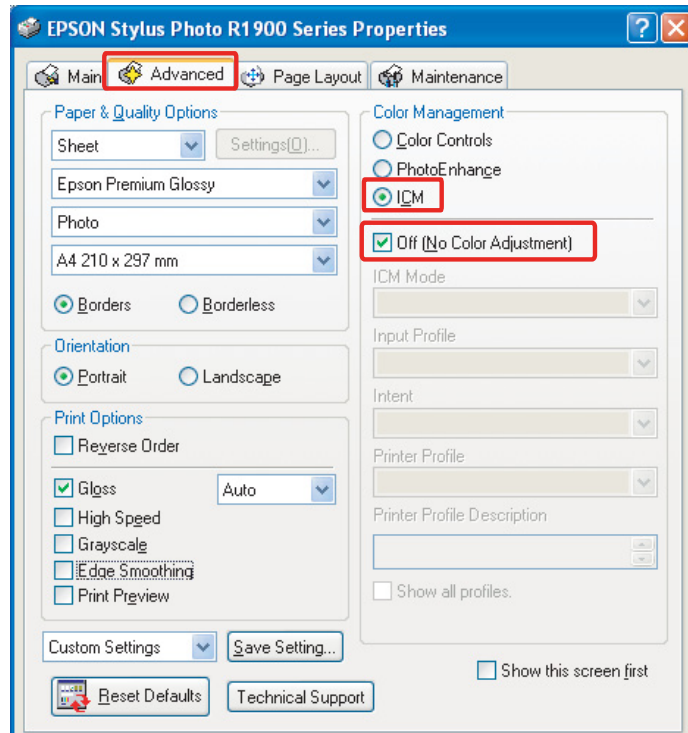
Note:

The printer driver type and supported OS differ depending on the printer model.

- 4** Open the printer driver window (Windows) or the Print dialog (Mac OS X).
- 5** For Windows, do the setting below depending on the printer driver type.

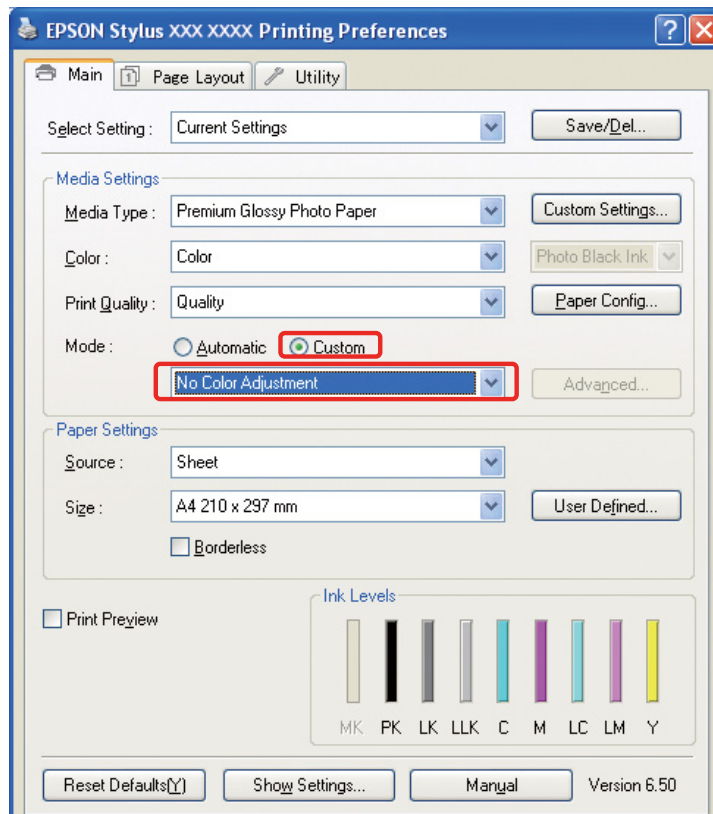
Type A

Click the **Advanced** tab, and select **ICM** for the Color Management, and then select **Off (No Color Adjustment)**.



Type B

Select **Custom** for the Mode in the Main menu, and then select **No Color Adjustment**.



For Mac OS X, do the following depending on the printer driver type.

<OS 10.4 or below>

Select **Color Management**, and then click **Off (No Color Adjustment)**.

<OS 10.5>

Select **Print Settings**, and then select **Off (No Color Adjustment)** for the Color Settings.

- 6** Check the other settings and print the image.

Other color management settings

Besides the color management methods explained above there is the Driver ICM method (Windows only) which uses the color management functions of the driver, and Host ICM (Windows)/ColorSync (Mac OS X) using the color management functions of the operating system. The various methods are explained below.

Color management using Host ICM/ColorSync

The application must support ICM or ColorSync. The following explanation is based on Adobe Photoshop Elements 5.0 in Windows.

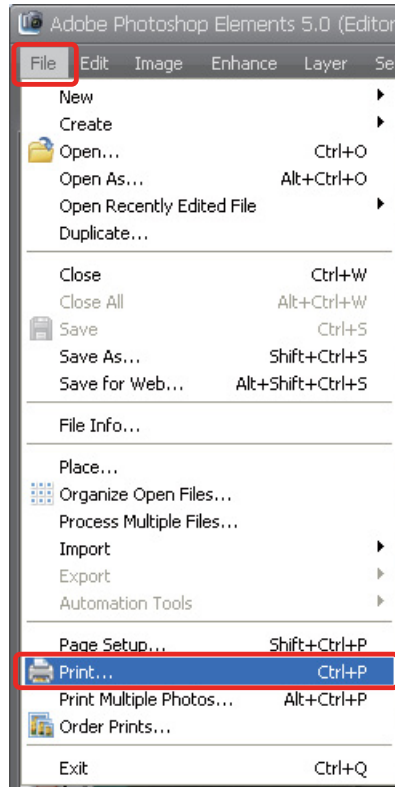
Note for Mac OS X 10.5 or later users:

- ❑ *If you use the combination of both specific Adobe applications (Adobe Photoshop CS2/CS3 and Adobe Photoshop Lightroom) and Mac OS X 10.5 or later, you cannot use the following procedures. Use other color management methods.*
- ❑ *Except for the combination above, you can use the following procedures.*

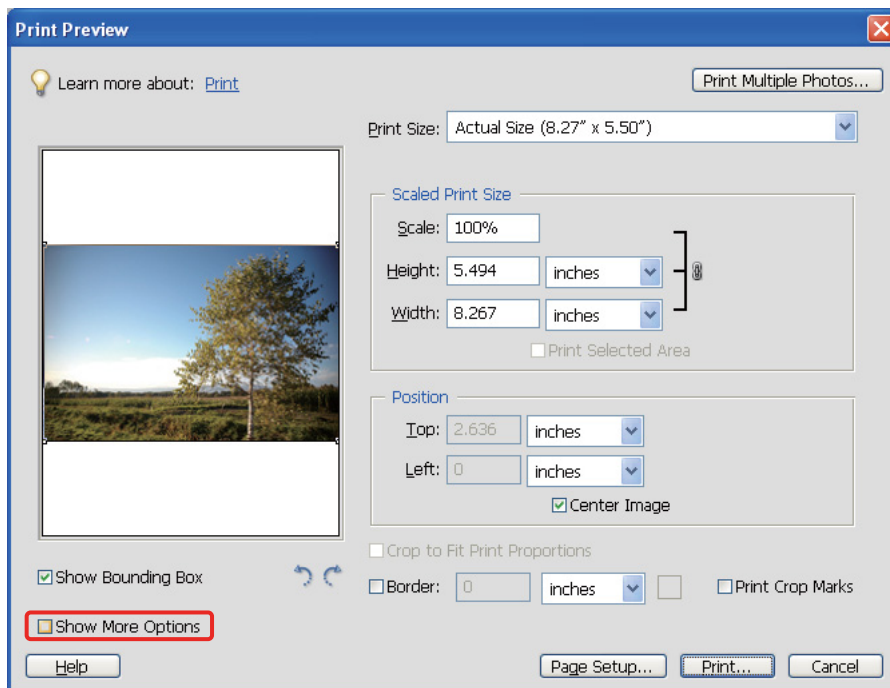
	Adobe Photoshop CS2 Adobe Photoshop CS3 Adobe Photoshop Lightroom	Other Applications
Mac OS X 10.4 or earlier	Available	Available
Mac OS X 10.5 or later	Not Available	Available

Set the application

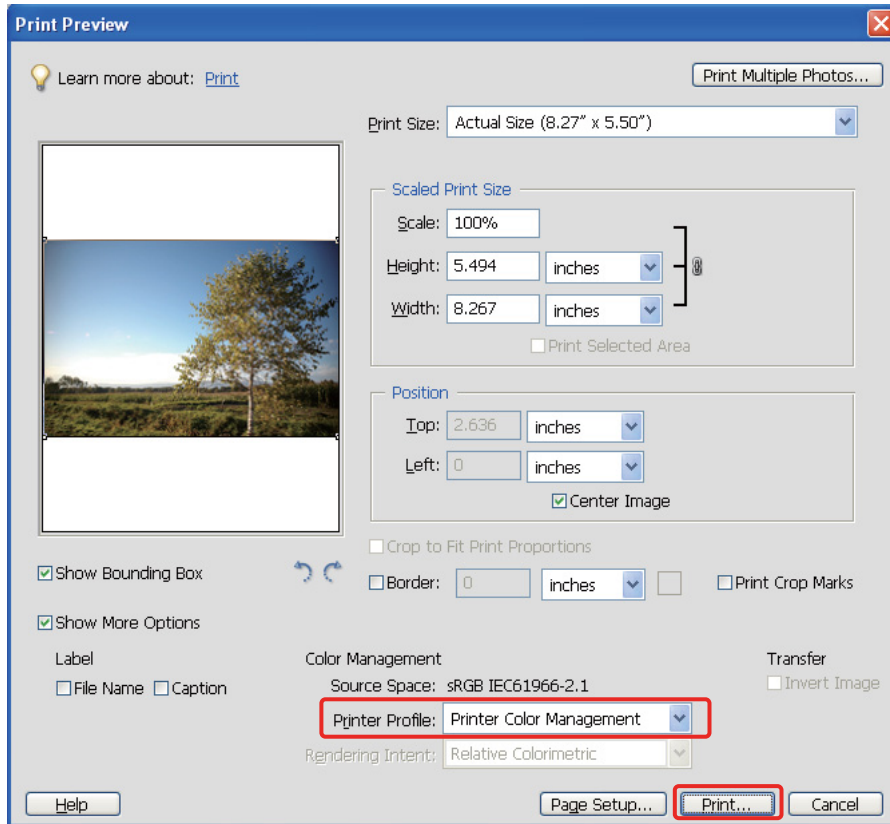
- 1 From the File menu, select **Print**.



- 2 Select **Show More Options**.



- 3 In the Color Management of the Printer Profile menu, select **Printer Color Management**, and then click **Print**. In Adobe Photoshop CS3, select **Color Management**, and then click **Document** for the Print. Select **Printer Manages Colors** for the Color Handling, and then click **Done**.



Set up the printer driver

Note:

The printer driver type and supported OS differ depending on the printer model.

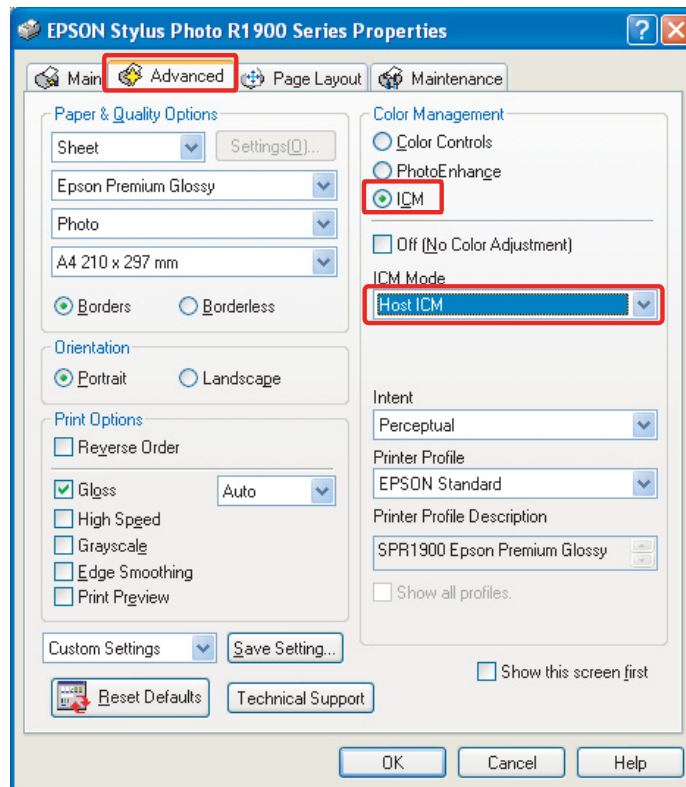
4 Open the printer driver window (Windows) or the Print dialog (Mac OS X).

5 For Windows, do the setting below depending on the printer driver type.

Type A

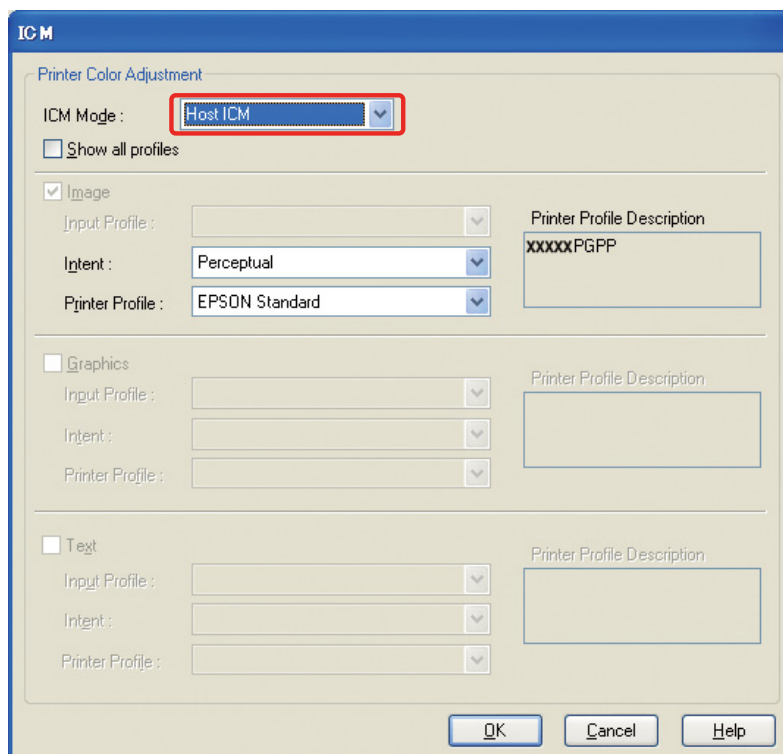
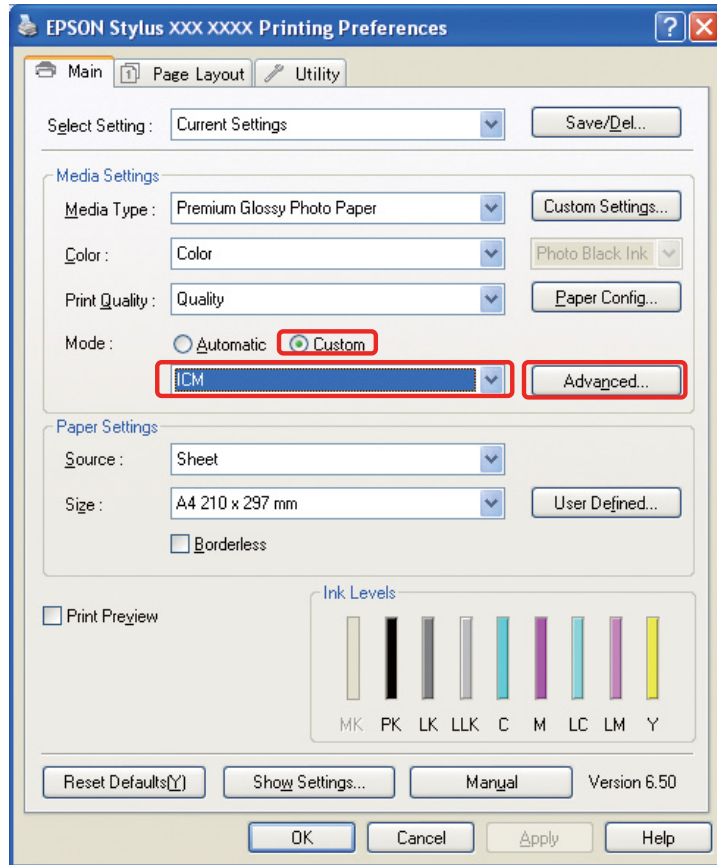
Click the **Advanced** tab, and select **ICM** for the Color Management, and then select **Host ICM** for the ICM Mode.

The ICC profile that you already set in the application is set in Input Profile, and an ICC profile corresponding to the paper type is set automatically in Printer Profile.



Type B

Select **Custom** for the Mode in the Main menu, and then select **ICM**. Next click **Advanced** and select **Host ICM** in ICM window.



For Mac OS X, do the following depending on the printer driver type.

<OS 10.4 or below>

Select **Color Management**, and then click **ColorSync**.

<OS 10.5>

Select **Color Matching**, and then click **ColorSync**.

- 6 Check the other settings and print the image.

Color management using Driver ICM (Windows only)

The following explanation is based on Adobe Photoshop Elements 5.0 in Windows.

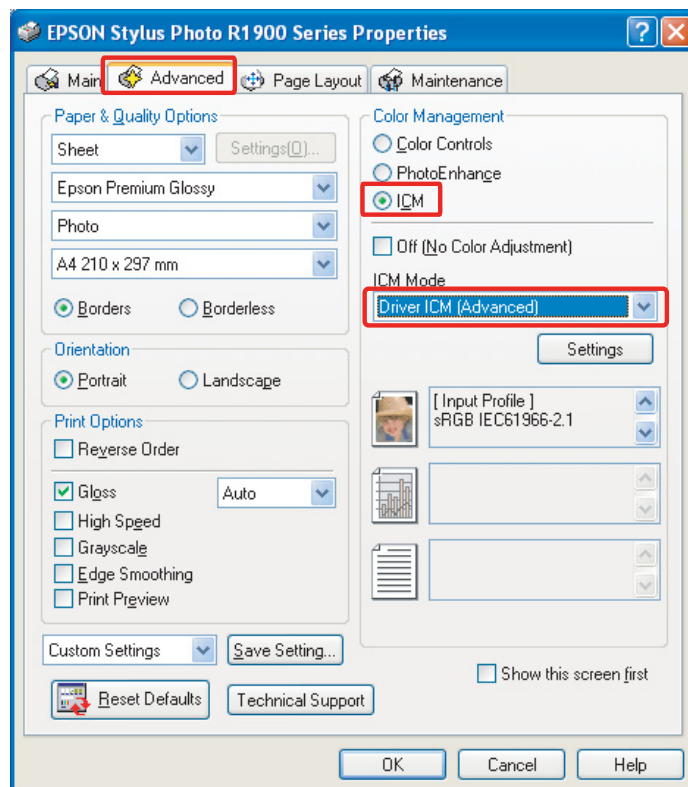
Note:

- ❑ If you use this function from an application that has color management functions such as Adobe Photoshop, you must turn off the color management function in the application.
 - ➔ See “Turn off the color management function of the application” on page 36.
- ❑ The printer driver type and supported OS differ depending on the printer model.

- 1 Open the printer driver window.
- 2 Do the setting below depending on the printer driver type.

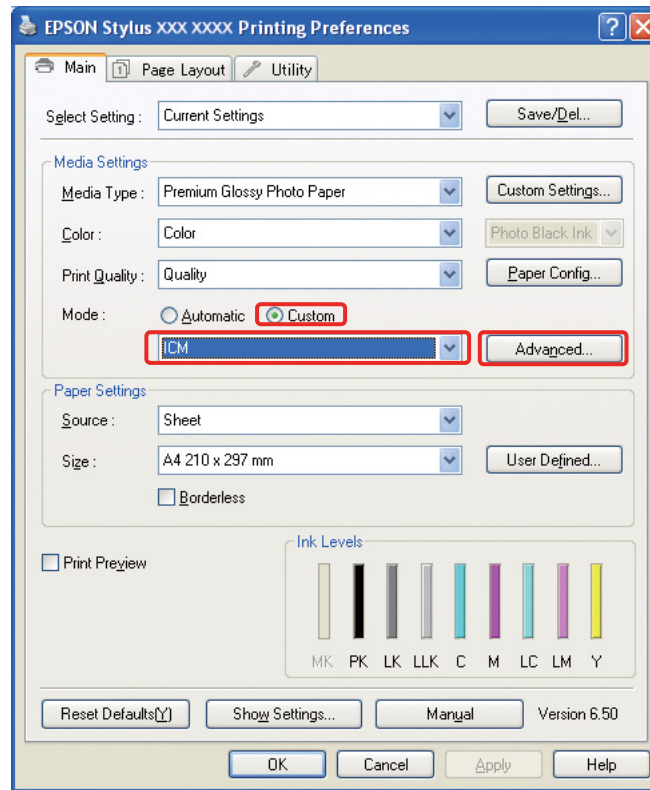
Type A

Click the **Advanced** tab, and select **ICM** for the Color Management. Next select **Driver ICM (Basic)** or **Driver ICM (Advanced)** for the ICM Mode.



Type B

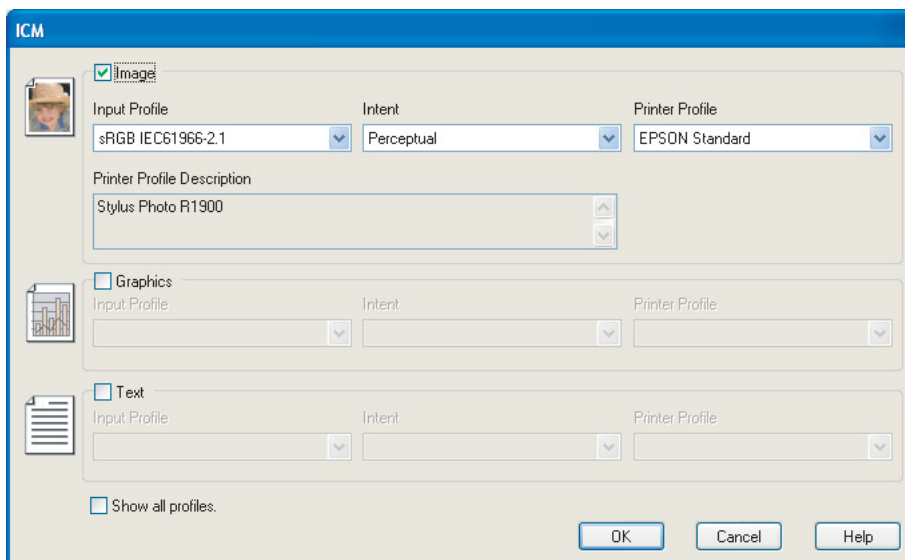
Select **Custom** for the Mode in the Main menu, and select **ICM**. Next click **Advanced**, and then select **Driver ICM (Basic)** or **Driver ICM (Advanced)** for the ICM window.



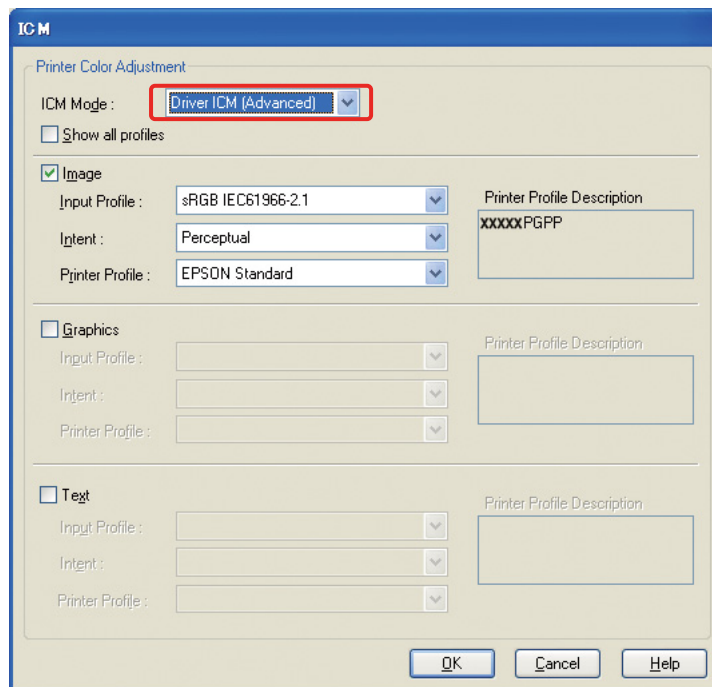
3

If you select **Driver ICM (Advanced)**, you can specify the profiles and intents for image, graphics, and text data individually.

Type A



Type B



Also if you select the **Show all profiles** check box, you can select from all the profiles registered in your computer.

Click **OK** to return to original screen.

4

Check the other settings and print the image.

Color adjustment using the printer driver

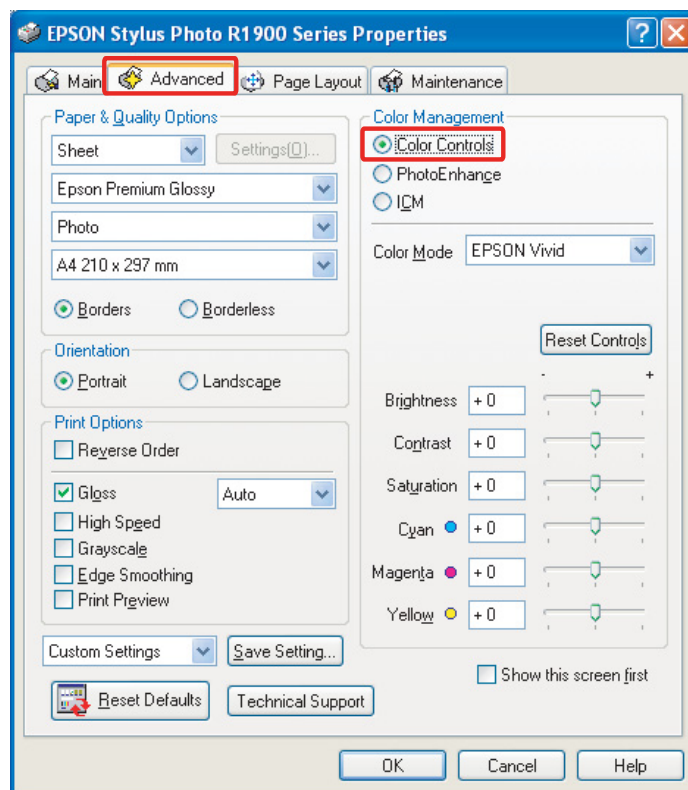
Before you print, make fine adjustments to the color level and brightness of the print data using the printer driver. Basically we recommend that you retouch your images in an application, but this method can be used if your application does not have color adjustment functions.

Note:

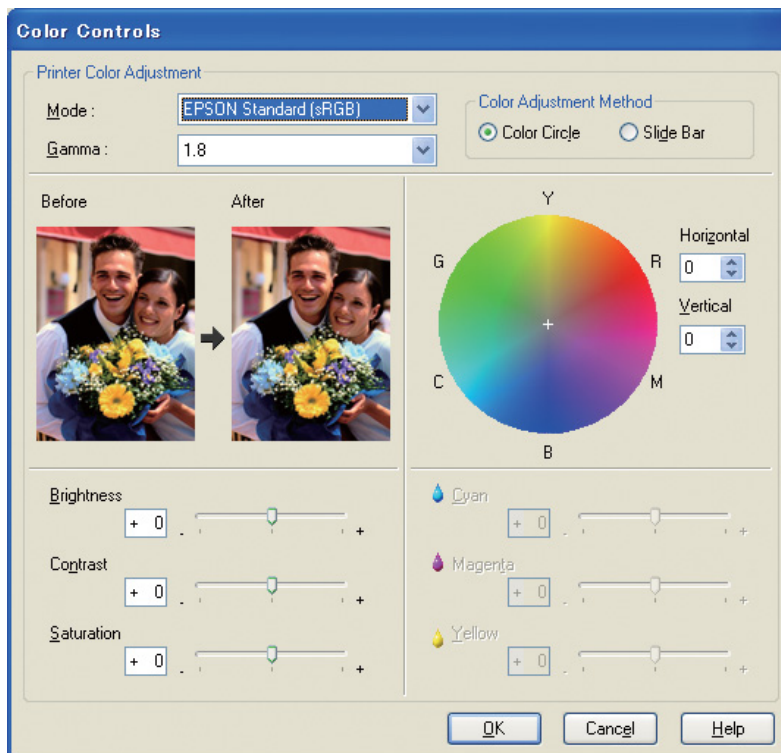
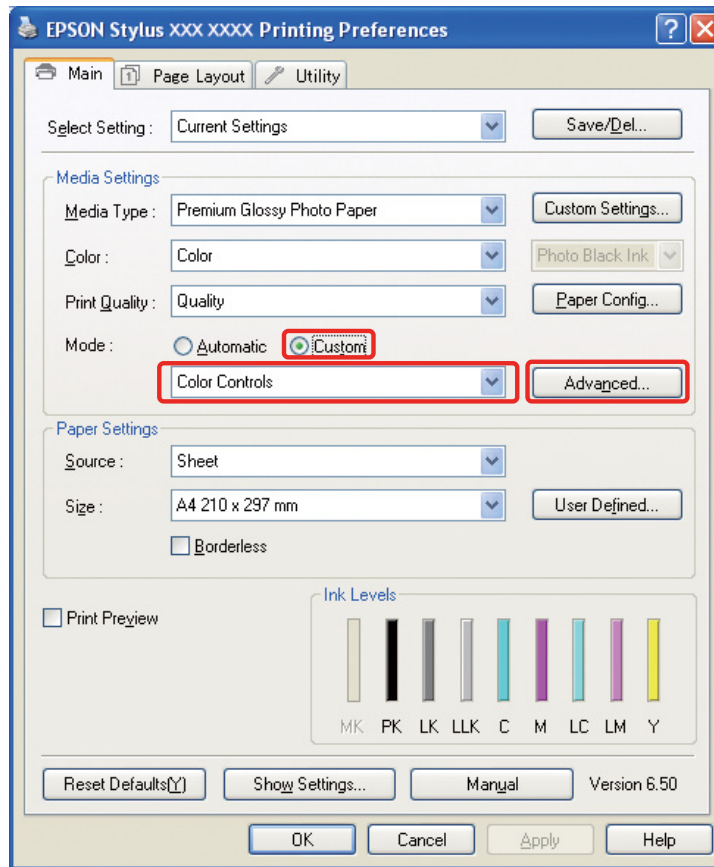
- ❑ If you use this function from an application that has color management functions such as Adobe Photoshop, you must turn off the color management function in the application.
→ See “Turn off the color management function of the application” on page 36.
- ❑ The printer driver type and supported OS differ depending on the printer model.

- 1 Open the printer driver window (Windows) or the Print dialog (Mac OS X).
- 2 For Windows, click the **Advanced** tab, and then select **Color Controls** for the Color Management (Type A) or select **Custom** for the Mode in the Main menu. Next select **Color Controls**, and then click **Advanced** (Type B).

Type A



Type B



For Mac OS X, do the following depending on printer driver type.

<OS 10.4 or below>

Select **Color Management**, click **Color Controls**, and then click **Advanced Settings**.

<OS 10.5>

Select **Print Settings**, select **Color** for the Color, and then click **Advanced Color Settings**.

Make the necessary settings.

See the online help of the printer driver for detailed information.

3

Check the other settings and print the image.

Note for Photo Enhance mode:

In this mode, the printer driver performs color correction automatically. This allows you to print your preferred levels using simple settings, without having to retouch the image. Colors are processed so that data with inappropriate contrast and saturation is corrected to enable a vivid print.

Printing Monochrome Photos

Use the Advanced B&W Photo mode of the printer driver. Whether the image data is monochrome or color, you can print high quality monochrome photos.

Note:

The Advanced B&W Photo mode may not be supported depending on the printer model.

Using the auto mode, you can print with your preferred tint just by selecting the tone, but if you use the advanced settings screen, you can print richly tonal monochrome photos without having to adjust the image in an application. Next we explain the settings screen for printing monochrome photos.

Tips:

Some models allow you to choose between matte black ink and photo black ink to ensure the best black for the paper. Since the paper types selectable with matte black ink and photo black ink are different, if necessary change the type of black ink.

Advanced settings for printing monochrome photos

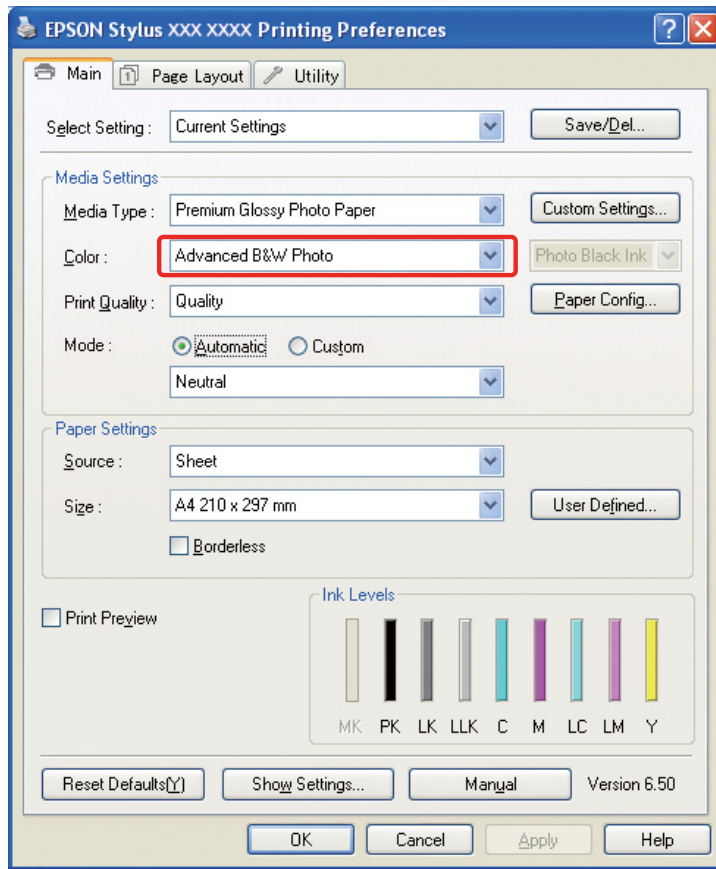
Note:

- Even when you are printing in monochrome, ink for all colors as well as black is consumed during printing and cleaning.*
- If you use this function from an application that has color management functions such as Adobe Photoshop, you must turn off the color management function in the application.*
 - *See "Turn off the color management function of the application" on page 36.*

1

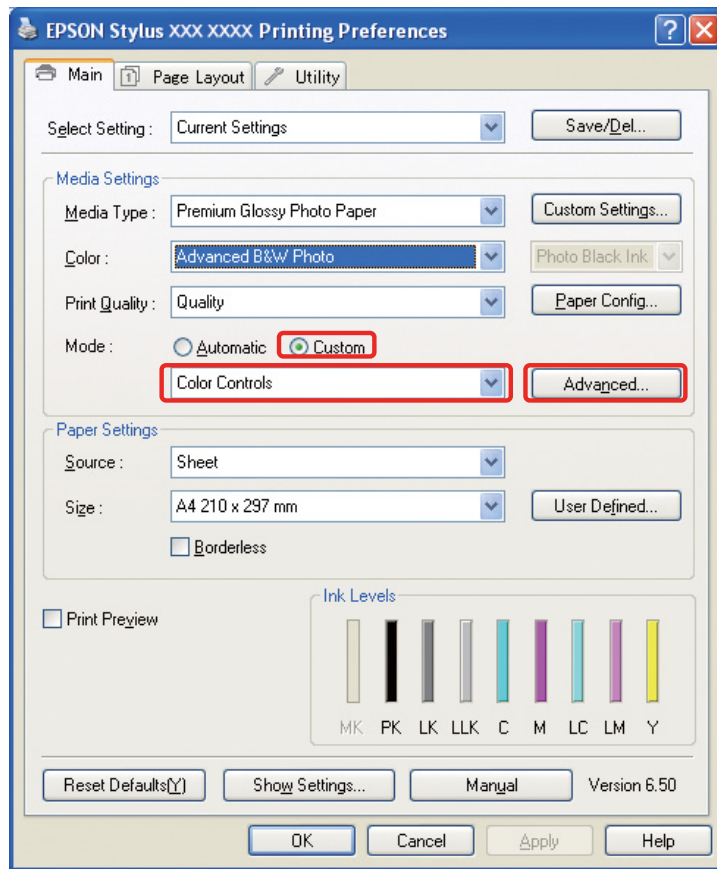
Open the printer driver window (Windows) or the Print dialog (Mac OS X).

2 For Windows, select **Advanced B&W Photo** for the Color.



For Mac OS X, select **Print Settings**, and then select **Advanced B&W Photo** for the Color.

3 For Windows, click **Custom** for the Mode, select **Color Controls**, and then click **Advanced**.



For Mac OS X, do the following depending on the printer driver type.

<OS 10.4 or below>

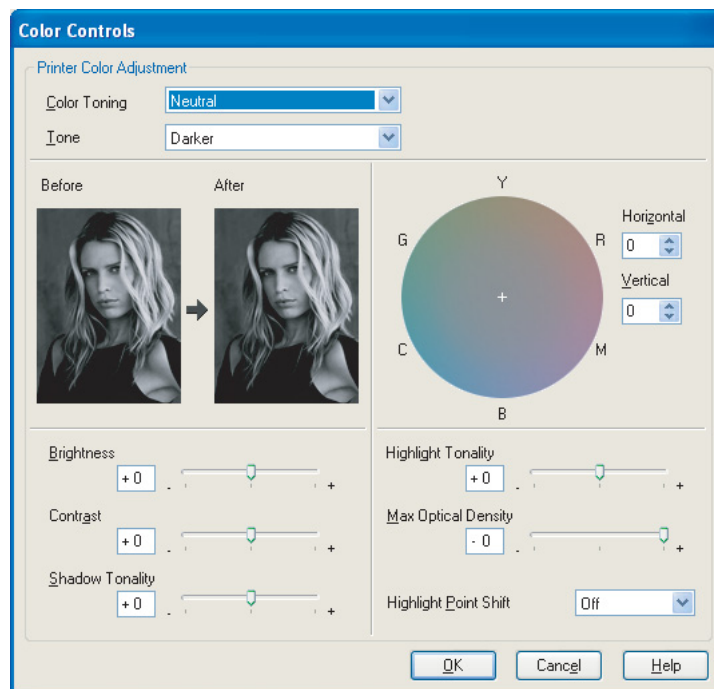
Select **Color Management**.

<OS 10.5>

Click **Advanced Color Settings**.

4 Make the necessary settings and print the image.

For more detailed information, see the online help of the printer driver.



Troubleshooting

Here we cover the main problems that may arise when you print photographs, and the ways of dealing with them.

The color shown on the monitor and in the print is different



- ❑ Color management may not be set correctly. Check the settings of the application and the printer driver.
 - ➔ See “Color Management Methods” on page 9.
- ❑ Make sure that the monitor is calibrated.
 - ➔ See “Monitor calibration” on page 11.
- ❑ Make sure that the Photo Enhance setting of the printer driver is off.
- ❑ If you are using Adobe RGB images, check whether the monitor supports Adobe RGB.

The color is not the same as another printer

- ❑ If you are using several printer models, check whether each model is set up for color management. (Each printer model reproduces color differently, so the same data may be printed with slightly different colors on each printer.)

Print quality is poor (uneven, too light, or too dark)

- ❑ Check that the mode does not favor speed over print quality. Set the quality to **Quality** or **Max Quality** to favor quality. If **High Speed** is on, turn it off.
- ❑ Check that paper type is set correctly. If the paper type settings in the printer driver are different from the paper actually loaded, the printer cannot control the amount of ink used properly. This will cause the ink to run and tones will not be smooth, resulting in poor print quality. In addition, if you use non-genuine paper, the same problems may arise.

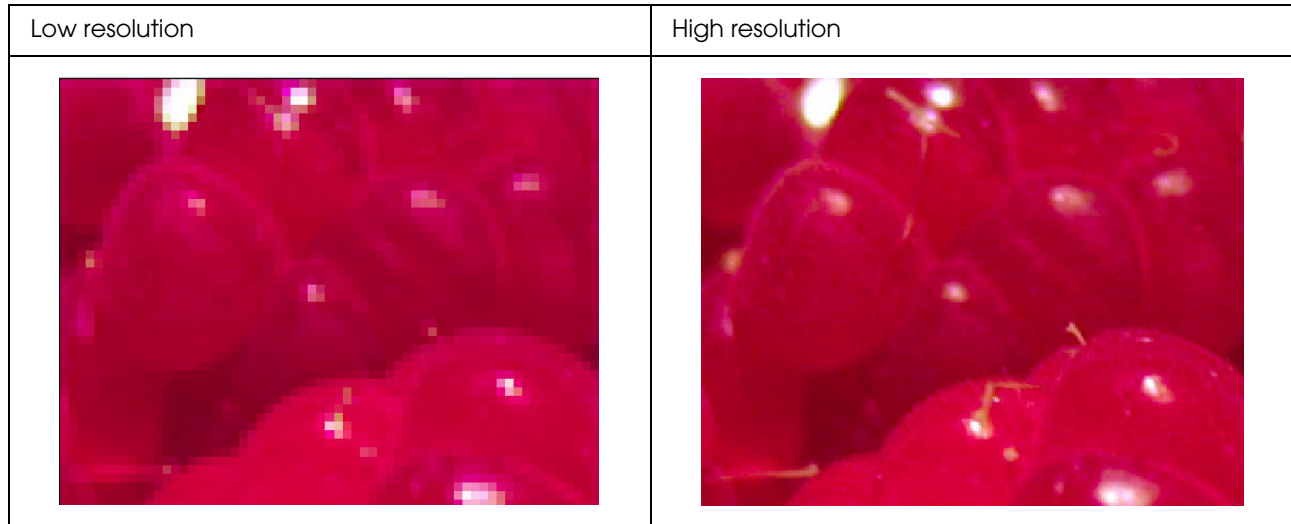
Printing with the wrong paper settings	Printing with the right paper settings
	

- ❑ Check that the head is not clogged. Perform a nozzle check and if necessary perform head cleaning.

An example of clogged heads that need cleaning	The same example after head cleaning
	

The results are blurred or jagged

- ❑ Check that the resolution is right for the print size.
 - ➔ See “The relationship between image data resolution and print size” on page 17.
- The same problem will arise if you crop a small area and enlarge it.





Even if the original data was captured at high resolution, if you save it in JPEG with a high compression ratio, the same problem will arise.



Roughness

- ❑ Check that the sharpness and saturation correction is not too high.

Sharpness is set too high	Sharpness is set just right
	
<p>Raising sharpness superficially sharpens the image, but raising it too far can make it look rough, destroying its texture.</p>	

Over saturation

Raising the color saturation superficially enhances the vividness of the colors, but raising it too far can cause loss of tonality similar to whiteout. In the histogram check the spread of black and white, but also check that RGB are each distributed well.

Saturation is set too high	Saturation is not adjusted
	
	
<p>In the image where saturation is raised too far, tonality is lost making the vertical lines on the door harsh to look at.</p>	

Step 7: Storage

Typically, printouts and photos fade over time (change color) due to the effects of light and various gases in the air such as ozone. Although Epson special media is made to minimize fading due to these influences, the degree of color change can be reduced further with the correct care for display and storage methods. Please refer to the instructions provided with Epson special media for details of how to handle the paper after printing.

Column:

Ozone is a naturally occurring oxidizing gas, but it may occur in higher concentrations around refrigerators, air purification systems and air conditioners.

How to Dry Printed Paper

- ❑ After printing the paper, lay out each sheet separately without overlap and folds. Leave it to dry naturally for about 24 hours.

Note:

- ❑ *If you place your prints in an album before they are completely dry, the colors may become uneven and the ink may peel off.*
- ❑ *Do not expose prints to direct sunlight.*
- ❑ *Do not apply heat with a hair dryer or similar appliance.*

Displaying Your Prints

- ❑ For displaying your prints indoors, we recommend that you use a glass cover. This will ensure that you can enjoy them for a long time without color loss. Dry the prints for about 24 hours before you frame them under glass.

Note:

- ❑ *For display outdoors, avoid places in direct sunlight. Prints may fade faster outdoors.*
- ❑ *If the printed surface is abraded roughly, the ink may get scratched.*

Long-Term Storage

- ❑ If you intend to store your prints, place them in clear files or similar holders after drying them completely. We recommend that you keep them in a dark place away from high temperatures, humidity, direct sunlight, air currents, and equipment that emits ozone. The best way to minimize the degree of color change is to isolate your prints from light and air currents.

Note:

Do not allow adhesive surfaces such as the printed side of silver halide photos to come into contact with the printed surface. If they stick to your prints, the ink may separate from the paper when you peel them off.